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ANALYSIS OF KULFI PREPARED BY FRUIT POMACE AND BURA (KHANDSARI)

Dushyant Siddhu^{1*}, Mohd Nayeem Ali²

¹*Ph.D. Scholar, ²HOD

¹Department of Dairy Technology, Sam Higginbottom Institute of Agriculture Technology
& science (Deemed to be University), Allahabad, Uttar Pradesh - 211007

²Department of Agriculture, Shri Ram College, Muzaffarnagar
(Email - dushyantsiddhu@gmail.com)

ABSTRACT

The present investigation was made with an attempt to develop a fruit pomace kulfi by partial addition with different level of pineapple pomace, orange pomace and pomegranate pomace, The kulfi samples of different treatments and control Physico-chemical analysis fat percentage, total solids, acidity, protein, moisture, ash, melting resistance was done for estimating its nutritional content and safety and Organoleptic characteristics like (flavour and taste, body and texture, colour and appearance) by trained panel list using 9 point hedonic scale. Average value of sensory characteristic of 4% combination of orange pomace incorporated in kulfi was found higher than all treatment combination. Thus as for as product acceptability judged by Organoleptic evaluation and therapeutic value is concern, the treatment can be rated as $T_6 > T_5 > T_1, T_3, T_4 > T_0, T_3, T_8 > T_7, T_9$.

Keywords : pineapple, orange, pomegranate, pomace and kulfi

INTRODUCTION

Kulfi also known as Malai Kulfi/ Malai-ka-burf is an indigenous frozen dairy product, which closely resembles ice cream in composition. In recent years, the consumption of ice cream in India has increased considerably in big cities and towns. After a long time it was realized that there is a need to develop the indigenous product, as they have ready market in India Aneja et.al., 2002. Simple stated, overall goal of designing the ice cream is to incorporate several different insoluble's (air bubbles, ice crystals and fat globules) into an aqueous phase in the smallest sizes and in the greatest number possible Sharma and Hissaria 2009. Kulfi has nutritional significance but possess no therapeutic properties. The growing interest of consumers towards therapeutic products Hoji 1982. Fruit pomace is a rich source of carbohydrates, dietary fibbers, minerals, vitamin C and also has high moisture content Extruded snack products are predominantly made from cereal flour or starches and tend to be low in protein with low biological value. The crude

fibre content of fruit pomace is approximately 14-30% of the dry weights. Sugarcane bura is traditional Indian sweetener which is produced in addition to sugar from sugarcane. These sweeteners are the natural mixer of sugar and molasses. The present investigation on qualitative of selected fruit pomace and bura with the following objectives: To optimize the process of manufacturing Herbal Kulfi, assess the Physico-chemical and Organoleptic, of the new formulation Kulfi.

MATERIALS AND METHODS

This experiment was carried out in the Lab of Student Training Dairy Warner school of Food and Dairy Technology, Sam Higginbottom Institute of Agriculture, Technology & Science, Deemed to be University, Allahabad (U.P.).

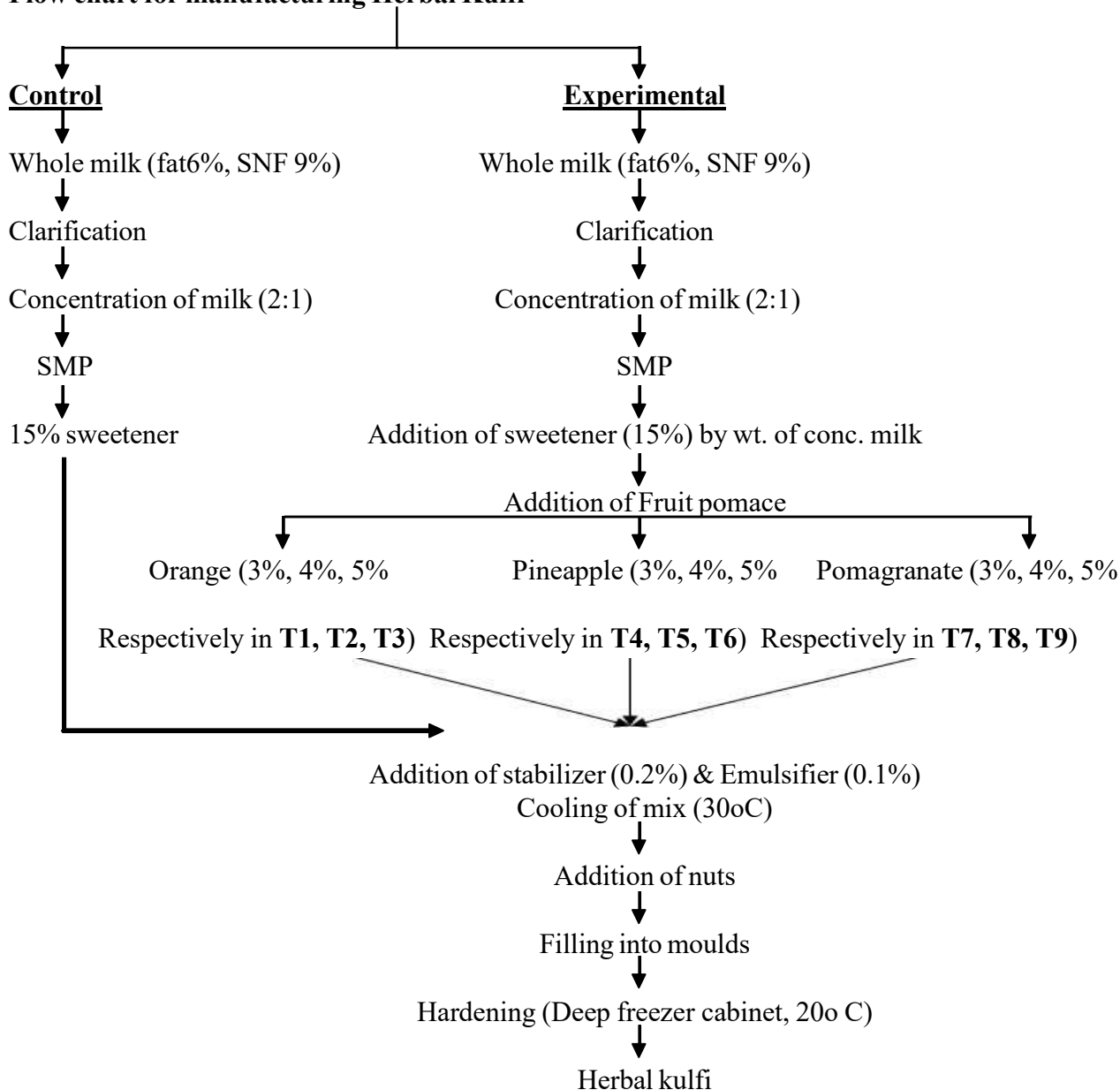
Skimmed milk powder Brand Anik spray, Sugar, Stabilizer, Emulsifier and Nuts were obtained from the local market of Allahabad. Bura and fruit was procured from local area of Allahabad.

TREATMENT

T₀ control sample of Kulfi mix was standardized to 10% fat, total solids 42.5%, sweetener 15%, 0.3 % of stabilizer and emulsifiers. Experimental sample of Kulfi mix was standardized to 10% fat, total solids 42.5%, sweetener 15%, 0.3 % of stabilizer

and emulsifiers. Fruit pomace the rate of addition Orange 3%, 4%, 5% respectively in T₁, T₂, T₃, Pine Apple 3%, 4%, 5% respectively in T₄, T₅, T₆ and pomegranate 3%, 4%, 5% respectively in T₇, T₈, T₉. Skim milk powder was added as a source of MSNF as required so that the formulation contains 42.5 % total solids.

Flow chart for manufacturing Herbal Kulfi



Source- Sukumar (1980)

Physico-Chemical Analysis:

Fat percent in frozen dessert-The fat percent in Kulfi was determined as per I.S.2802 (1964)

Determination of total solids - Total solids in plain Kulfi and probiotic Kulfi was determined gravimetrically as per the procedure laid down in dairy chemistry manual, ICAR Publication and in **IS:1479,Part: II, 1961(20)**

Determination of moisture- The moisture percentage in Kulfi was determined as per procedure laid down in **IS.1165 (1957)**.

Moisture percentage in skim milk powder- The moisture percent in skim milk powder will determined as per **I.S.1165 (1957)**.

Percentage of Acidity- Titratable acidity of samples (expressed as lactic acid) was determined as per the procedure laid down in **IS: 1479, Part: I. (1960)**

Organoleptic evolution- The Kulfi samples of different treatments was analyzed for organoleptic Quality (flavour, body, texture, colour, appearance and melting resistance). Attributes was rated on nine point Hedonic scale (**Nelson and Trout, 1964**)

RESULTS AND DISCUSSION

Chemical analysis (Moisture, Fat, Total Solids, Acidity, Protein, ash, pH) was done for estimating its nutritional contents of kulfi sample. Organoleptic characteristic like (Malting, Viscosity, Hardness, Colour, Taste, Flavour, Texture and Appearance) was evaluated by sensory methods using in 9 point hedonic scale. Showed the average values of Physico-chemical and organolaptic given in Table 1.

Effect of different combination of fruit pomace on Physico-chemical and sensory properties of Kulfi.

The present study was done by incorporated different combination of pineapple pomace, orange

Table 1. The average value of physico-chemical and organolaptic of fruit pomace kulfi

Parameters	Chemical and Organolaptic average values of Samples										CD
	Control	Pineapple Pomace			Orange Pomace			Pomegranate pomace			
		3%	4%	5%	3%	4%	5%	3%	4%	5%	Value
Mosture	57.52	57.40	57.70	57.60	57.50	57.44	57.81	57.33	57.51	57.75	0.1690
Fat	10.006	10.086	10.27	10.53	10.22	10.24	10.92	10.04	10.25	10.756	0.010921
Protein	3.516	3.58	3.644	3.74	3.648	3.708	3.76	3.594	3.716	3.746	0.7342
Acidity	0.192	0.204	0.222	0.234	0.222	0.234	0.248	0.206	0.218	0.236	0.008106
T.S.	42.30	42.50	42.60	42.53	42.54	42.52	42.71	42.56	42.64	42.68	0.042178
Ash	0.51	0.572	0.61	0.726	0.616	0.628	0.738	0.614	0.624	0.732	0.012422
PH	6.428	6.152	6.156	6.214	6.16	6.158	6.182	6.168	6.176	6.212	0.024015
Melting	6.016	6.402	6.454	6.472	6.358	6.438	6.51	6.382	6.424	6.49	0.028252
Viscosity	25.65	26.26	27.24	26.89	28.78	29.27	29.78	29.54	27.66	28.25	0.028252
Hardness	9.856	8.658	8.55	7.858	8.256	7.454	7.36	8.692	8.166	7.562	0.028252
Colour	7.25	6.75	7.50	7.25	7.75	7.75	8.00	6.75	7.00	7.25	0.001254
Taste	7.50	7.75	7.75	7.5	7.75	8.00	8.25	7.25	7.5	7.25	0.001254
Flavour	6	6.75	7.00	7.00	7.15	8.00	7.75	7.75	7.75	7.25	0.001254
Texture	6.75	7.00	7.15	7.00	7.00	7.25	7.25	7.00	7.25	7.00	0.001254
Apperance	7.25	7.50	7.75	7.75	7.25	8.00	7.75	7.00	7.15	7.00	0.001254

pomace and pomegranate pomace viz. 3%, 4% and 5% respectively in kulfi. The kulfi of best sample i.e. combination of 4% orange pomace accorded to sensory evaluation. Analyzed the data of Moisture, Fat, Total Solids, Acidity, Protein, ash, pH were found significant ($p < 0.05$). The data of samples of kulfi were found five present combination of pomace higher than 3% and 4% combination of pomace. The compositional attributes of all samples are well above maximum and minimum values specified for kulfi 'FSSAI, 2011.

The kulfi of best sample i.e. 5% Fruit pomace included kulfi was evaluated for various sensory qualities were also other levels of fruit pomace included kulfi. Parameters of sensory quality assessment were Malting, Viscosity, Hardness, Colour, Taste, Flavour, Texture and Appearance. The maximum score of overall acceptability was found in 5% fruit pomace included kulfi while minimum score was recorded of 0% powder included kulfi. Statistical analysis of Malting, Viscosity, Hardness, Colour, Taste, Flavour, Texture and Appearance both data was found significantly ($p < 0.05$). Physico-chemical characteristic as Fat, Total Solids, Acidity, Protein, ash will be increased and moisture decrease if adding the any solid materials in milk products (Ali, et al., 2016; Ayar and Gurlin, 2014). It is made from dairy products such as cream combined with flavours and sweeteners such as sugar (Arbuckle, 1986) Keeping in mind the above statement it was planned to preparation of fruit pomace kulfi. The experiment aims to formulate a nutritional improved with the following objectives. To evaluate the Physico-chemical and Organoleptic characteristic of formulated kulfi.

CONCLUSION

It is concluded from present investigation samples prepared in the laboratory were superior in all respect of sensory and chemical attributes. A good quality kulfi could be made using the milk of good quality buffalo milk, adding khandsari, stabilizer in proper ratio fruit pomace. Best sample was found 4% incorporate orange pomace according to sensory

evaluation which prepared by pineapple pomace, orange pomace and pomegranate pomace viz. 3%, 4% and 5% respectively. It is thus anticipated that fruit pomace kulfi will in future provide additional benefits to consumers with respect to convenience, price and health.

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A STUDY OF GENDER SPECIFIC INVESTMENT PATTERNS

Dr. Yasmeen Ansari

Assistant Professor,
Bharat Institute of Technology, Meerut

ABSTRACT

When dealing with financial decision making, one is often confronted with a gender stereotype, i.e. with the opinion that women are more risk averse than men. The existence of gender differences raises important questions, particularly in light of the recent trend toward investment patterns of men and women. However, assuming that this is a cause for concern, appropriate policy interventions can be more effectively designed with better understanding of the fundamental causes for differences. This issue is important not only to investors, but also to sponsors and professionals who provide investment information to clients. Hence, this study aims to gain knowledge about key factors that influence investment behavior and ways these key factors impact investment risk tolerance and decision-making processes among men and women. It further explores types of processes that can transform investment behavior among women. Hence, keeping this in mind this paper aims: (1) to study the demographic characteristics (such as age, profession, education and income) of investors in relation to gender, (2) to study the investment patterns of the investors in relation to gender and (3) development of gender-specific guidelines to develop investment habits among the investors.

Keywords: Investment Pattern, Investment Habits, Women investment

INTRODUCTION

INTRODUCTION

When dealing with financial decision making, one is often confronted with a gender stereotype, i.e. with the opinion that women are more risk averse than men. An increasing number of financial studies conclude that women invest their asset portfolios more conservatively than their male counterparts. Although there is a large body of literature on gender differences in investments', examination of differences in investment behavior is a relatively new avenue for research. The existence of gender differences raises important questions, particularly in light of the recent trend toward investment patterns of men and women. However, assuming that this is a cause for concern, appropriate policy interventions can be more effectively designed with better understanding of the fundamental causes for differences. This issue is important not only to investors, but also to sponsors and professionals who provide investment information to clients. Hence, this paper focuses on the gender differences in investment behavior, their demographic

characteristics and development of gender-specific guidelines to develop investment habits among the investors.

BACKGROUND REVIEW

Recent economic trends have shown that individuals and households are becoming increasingly responsible for their own financial security. Financial security greatly depends on the ability to save and invest one's earnings. It can help individuals and households better cope with unexpected life events. Perhaps most importantly, it can be a significant source of retirement income for individuals and families who are less able to rely on Social Security alone. One source of concern, especially in today's economic climate, is the persistent gap in investment behavior between men and women. Women's investment has historically been lower than men's for several reasons, including social and various demographic concerns. However, the difference continues to be significant even after controlling for individual characteristics (Schmidt & Sevak, 2006).

Women's investment choices are different from men's. Sunden and Surette (1998) found that demographics, financial characteristics, and attitudes were important controls, but that these did not fully explain gender differences. While there is not a known psychological reason why gender should matter, it may be that gender is a proxy for other factors that influence financial decisions like risk aversion and financial literacy. There is evidence that women are more risk averse than men in general and this translates to investing in less risky assets in their investment plans (Julie R. Agnew, Pierluigi Balduzzi and Annika Sunden 2003). Differences in financial literacy between men and women may also explain differences in their investment decision. In most studies measuring financial literacy, women score lower than men, and it is possible that literacy is driving the investment decisions among men and women. In fact, Peggy D. Dwyer, James H. Gilkeson and John A. List (2002) find that the gender differences observed in mutual fund investment decisions can be largely explained by differences in knowledge.

Risk tolerance is the acceptable amount of risk an individual investor is willing to undertake. While risk tolerance is only an individual preference, large deviations of risk preference between social groups of people (e.g., race, education) can lead to different portfolio returns and wealth inequalities. High-risk investors are more likely to invest in annuities, corporate bonds, and stocks than CDs, money market accounts, and cash (e.g., savings accounts and money market funds). It is a widespread belief that women are more risk averse than men in making financial decisions. This belief can have critical implications for the financial well-being of women (Schubert, Brown, Gysler, & Brachinger, 1999). In a survey of mutual fund investors, Dwyer et al. (2002) found that women took less risk than men in their mutual fund investment decisions. However, the impact of gender on risk-taking was reduced significantly when they controlled for the investor's financial knowledge.

RESEARCH METHODOLOGY

On the basis of preceding discussions, this study is based on the responses of an incidentally selected national sample of 500 respondents. The study is mainly confined to north India while few more states have also been included in this study. The population of U.P., Bihar, Uttarakhand and Delhi are mainly covered while few cases from Mumbai, Bangalore and Chennai have also been included. The two variables of this study are investment patterns and demographic variables (age, profession, education and income) of the investors in relation to gender. In order to measure the demographic characteristics and investment patterns of the investors, a self-designed questionnaire was constructed and administered on the selected sample. The questionnaire is based on various aspects of respondents' investment behaviors, attitudes and beliefs. The investors' were contacted through share brokers, banks, financial institutions, relatives, family and friends.

FINDINGSs

Demographic Characteristics in the relation to Gender

Demographic characteristics in the relation to gender were analyzed. These characteristics include age, education, profession, and income. About three-fourth (84.4%) of the respondents were males and one-fourth (15.6%) of the respondents were females. It is evident from the information presented in Table 1 that the largest concentration of males (38.8%) than females (6.8%).

Respondents were asked to provide information about their current profession. As can be seen from the Table 1, there were notable differences between the profession of males and females in the study. The percentage of males employed in the professional category was 21.6% in comparison to females (3.2%). They were engineers, physicians and architects. On the other hand, more males (17%) than females (8.4%) were academicians. Much more males (15.2%) than females (1.4%) held managerial positions such as financial analysts, executives and managers. Much more males than females were self-

Table 1.

Variables	Total		Men		women	
	N	%	N	%	N	%
	500	100	422	84.4	78	15.6
Age						
Below 25 years	114	22.8	79	15.8	35	7
25-40 years	228	45.6	194	38.8	34	6.8
40-60 years	123	24.6	31	23.6	5	1
Above 60 years	35	7	31	6.2	4	0.8
Profession						
Professional	124	24.8	108	21.6	16	3.2
Academicians	127	25.4	85	17	42	8.4
Managers	83	16.6	76	15.2	7	1.4
Businessman	106	21.2	101	20.2	5	1
Any other	60	12	52	10.4	8	1.6
Education						
Intermediate	21	4.2	18	3.6	3	0.6
Graduates	149	29.8	130	26	19	3.8
Post-graduates	283	56.6	235	47	48	9.6
Any other	47	9.4	39	10.4	8	1.6
Income						
1 lakh-1.5 lakh	108	21.6	78	15.6	30	6
1.5 lakh-3 lakh	261	52.2	225	45	36	7.2
3 lakh-5 lakh	107	21.4	96	19.2	11	2.2
Above 5 lakh	24	4.8	23	4.6	1	0.2

employed in business & management. 10.4% of males in comparison to females (1.6%) employed in any other areas such as administrators, technicians & programmers etc.

Participants were also asked to indicate about their education status. More males (47%) in comparison to females (9.6%) were holding postgraduate degrees while 26% & 3.8% Table (1) Respondents' Demographic Characteristics

Respectively were holding graduate degree. Very negligible percentage (3.6% & 0.6%) of respondents held intermediate certificates while 10.4% & 1.6% respectively were holding any other

degree such as M.Phil, PhD, and LLB etc. Respondents were also asked to report about their income status. It has been found that the largest income group earned by the respondents was between 1.5 lakh to 3 lakh. Compared to their male counterparts women had lower income group and faced greater financial obligations.

INVESTMENT PATTERNS

Investment patterns mean putting one's money to work for them or it's a different way to think about how to make money. This includes putting money into stocks, bonds, mutual funds, real estate and gold etc.

(a) Primary Objective for Investing/Spending

Participants were asked to indicate their objective for money investing/spending. Response categories include car purchase, children's education, payment for a home/down payment, savings for retirement, vacation, business and any other. Responses showed that 9.2% of males invest for car purchase in comparison to females (1.8%). 26.2% and 5.4% correspondingly invest for their children's education. As per findings the males take the most responsibility for making the payment of home/down payment as compared with females. The percentage is being 9.6% and 1% respectively. 13.2% of males and 1.6% of females invest for their retirement while 3.4% of males and 1.6% of females invest for their vacation. 16.8% of males and 3% females invest for business and a very small proportion of males (6%) and females (1.2%) invest in any other activities such as children's marriage, higher education etc.

(b) Regular Contribution to a Saving Plan for Future

Participants were asked to respond whether they contribute regularly for their saving plan for future needs or not. A larger percentage of males (75.6%) than females (10.8%) reported 'yes' for regularly contributing for their savings for future needs. On the other hand, a very small proportion of males (8.8%) and females (4.8%) reported 'no' for contributing for their future needs.

(c) Reasons to Invest

Participants were asked to account for their investment reasons for investing. Possible responses include risk coverage, tax benefits, returns, safety and protection from inflation. 33.4% of males in comparison to females 6.2% reported that they preferred for safety than returns (18.2% & 2.8%). More males (16%) than females (4%) reported for risk coverage, tax benefits (11.6% and 1.6%) and negligible percentage of the sample investigated would like to protect them from inflation. The percentage being 5.2% and 1% respectively.

(d) Source of Financial Information:

It explored the various sources of financial information that respondents used for financial decisions. We asked how frequently they have obtained investment information from TV, radio, books, magazines, newspapers, internet, investment newsletter, family/friends, professional advisors and any other. More males (15.8%) in comparison to females (1.6%) read newspapers for investment guidance, 13.8% males & 2% females reported that they access internet or investment related websites, 12.4% & 3.2% correspondingly take advice from their family/friends, whereas 10.8% & 2.4% seek advice from professional advisors in order to make right investment decisions. A small percentage (9.2% & 1.8%) watches TV programs while very small percentage of respondents (2.4% & 0.2%) listen radio for getting information related to investment and financial institutions. A much smaller percentage refers books (5.8% & 2.2%), magazines (8.2% & 1.6) and investment newsletters (5.8% & 0.4%) for this purpose. The negligible but the same percentage (0.2%) in both the cases of the investigated sample shows interest in any other areas such as participating in investment clubs, conferences, seminars or workshops.

(e) Time Spent on Investment Activities

Participants were asked to think about the time duration they devote for their investment activities. Responses include 2-5 hrs/week, 2-5 hrs/month, 2-5 hrs/year, most of my spare time and as little time as possible. More males (23.4%) than females (5%)

devote their 2-5 hrs/month in investment related activities. More males than females spend as little time as possible (18.6% & 2.8%) whereas 17.2% and 2% spend 2-5 hrs/year in investment actions. More males (16.8%) than females (3.6%) spend 2-5 hrs/week whereas small percentage (8.4% & 2.2%) spend most of their spare time in investment activities.

(f) Investment Knowledge

For information gathered in response to the question, "how much you rate your investment knowledge", the possible responses were minimal, modest, moderate, good and very good. It can be found from the information provided by the respondents that much more males (30%) in comparison to females (4%) reported for moderate knowledge. Similarly, more males (21.8%) than females (3.8%) reported for good knowledge. A small percentage of the sample investigated (12% & 2%) reported for modest knowledge and 11.6% & 4.6% respond for minimal knowledge and similarly 9% & 1.2% have a very good knowledge about investment related activities.

(g) Why do Investors tend to sell liquidate investments?

Participants were asked to respond the reasons for which they tend to sell their liquidate investments. Various responses included here are my advisors recommends I sell, of market fluctuations, need money for buying a home/car, the news lines suggest the market is going down and any other. The information reveals that a majority of males (25%) than females (3.4%) sell because their advisor recommends them to sell whereas more males (19%) than females (4.4%) sell because the news lines suggest the market is going down. 18% & 5% respectively sell because of market fluctuations. A small percentage of respondents (16.6% & 2.6%) sell because they need money to buy a home/car whereas a very small percentage (5.8% & 0.2%) sell for any other reason such as for higher education, invest in some other assets or for expanding their business.

(h) Reinvesting the Sold Investment

It explored the actions investors take when they would sell their investments. They were asked to respond to the following responses: buy another investment, put money in a money market fund, partly invested & partly use to buy something, ask for investment advice and don't know what they would do. As per the findings the males (30%) partly invested & partly use to buy something as compared to females (7.2%). More males (19.8%) than females (1.8%) put the money in a money market fund. Similarly, 17.4% & 3.8% respectively, buy other investments. A small percentage of respondents (13.2% & 1.8%) asked for investment advice and a negligible percentage (3.6% & 1%) of respondents don't know what to do with the sold investments.

(i) Opinions of Investors towards Financial Advisor

Participants' were presented the various qualities such as trust, education, helps in dealing with financial stress, confidentiality, investment knowledge, fee structure and an ongoing relationship. The findings indicate that the most of the males (19.9%) look for investment knowledge in their financial advisor than females (3.4%). A large percentage of males (18.8%) in contrast to females (2%) favored educated financial advisor. More males (17.6%) desire confidentiality in comparison to females (2.4%) similarly, (14.6% & 4.4%) likes advisors who help them in dealing with their financial stress. Small percentages (7.6% & 2.4%) of respondents have faith in their financial advisor. More males (3.4%) than females (0.6%) have a liking for fee structure and an ongoing relationship (3.4% & 0.4%) with their financial advisor.

(j) How long they have been the investors?

This question inquired about for how long they have been the investors. This measure captures respondents' confidence in investment activities. Respondents were asked to respond in the categories of, 0-2 years, 2-5 years, 5-10 year, and more than 10 years. Overall more males (26.2%)

than females (5.2%) have been in investment activities for 2-5 years; more males (21.2%) in contrast to females (6%) have been into investment from 0-2 years'. 18.6% & 2.8% respectively have been into the investment for the last 5-10 years whereas 18.4% & 1.6% are continuing their investment for more than 10 years investment.

(k) Short-term vs. Long-term Investments

To gather rather extensive information about participants' confidence about the time period they consider that they would like to remain in their investment activities, they were asked to respond for: less than 3 months, 3-6 months, 1-2 years, 2-3 years and more than 3 years. As per findings, most of the males (23.2%) than females (3.6%) would like to remain invested for more than 3 years. Findings suggest that 20.2% males than 6.8% females would like to invest for 1-2 years and 17.6% & 2% respectively would like to be invested for 2-3 years and the percentages for the 3-6 months are 16.4 & 1.6. Negligible percentage of the sample investigated (7% & 1%) reported for less than three months investment period.

(l) Types of Investments

Participants were asked to respond for the investment avenues they hold from the available choices: stocks, mutual funds, real estate, government securities such as NSS, NSC, PPF & KVP, gold, art & paintings and any other. The information indicated more males (28.4%) than females (3.8%) have invested in government securities such as NSC, NSS, PPF & KVP. 25.4% of males in comparison to females 3.8% would like to invest in mutual funds while 14.2% & 4% respectively invest in real estate. A small percentage (9.4% & 2.4%) likes to invest in gold and a much smaller percentage (4% & 0.8%) would like to invest in stocks. It is also supported by the findings of Bernasek and Shwiff (2001) who found that women invested a significantly lower percentage of their money in stocks. Participants (2.2% & 0.6% only) report that they invest in any other areas such as diamonds, gems, or bank deposits and similarly negligible percentage of respondents (0.8% &

0.2%) reported their investment in art & paintings.

(m) Awareness of financial planning

Participants were asked to respond by saying 'yes' or 'no' about their awareness of financial planning. Responses collected show that majority of males (70%) in comparison to females (11%) respond for 'yes' whereas a small percentage (14.2% & 4.6%) respond for 'no' for their awareness about financial planning.

(n) Strategy of Investors in case the Stocks Slide

Participants were asked to identify about their decisions they will take if their stocks went down 50%. They were asked to select any one out of the following choices: sell it, buy more, hold on at least until it reached at price I originally purchased, consult a professional, contact the company, and ignore the loss. The findings suggest that 25.6% of males in comparison to females (4.6%) will hold on at least until it reached at price at which they originally purchased, 21.2% & 4.6% respectively would like to consult a professional and 17.4% & 1.8% correspondingly would like to sell it. 11.4% & 2.4% respectively buy more and a negligible percentage of respondents (5% & 1.2%) want to contact the company and ignore the loss (3.8% & 1%).

(o) Apprehensions about Investment

This question explored respondents' actions when they have fear about investing. The possible responses include losing money, making a mistake, others finding out I failed, lack of knowledge, and lack of experience. The information reveals that most of the respondents (33.8% & 6.2%) fear about losing money, while 20.8% & 5% point out of making a mistake. Respondents also indicate lack of experience (11.8% & 1.8%) and knowledge (10.8% & 2.4%) in investment activities. And a small percentage (7.2% & 0.2%) shows that they fear from others finding out that they failed.

Gender-specific Guidelines to Develop Investment Habits

Following are the guidelines that can help in

developing investment habits among men and women:

- i. Financial professionals and educators should interpret measures of risk tolerance, especially when working with women. Women may tend to understate their risk tolerance and their observed preference for more conservative investments may result from a lack of financial knowledge. Thus, before recommending overly conservative portfolios to women, there may be a need to better educate women about the risk-return trade-off and help them make more informed choices.
- ii. In addition, there is a need for more specific and targeted financial education to help men and women with their investment decisions. Men may need to be cautioned about the pitfalls of trading excessively, which leads to a fall in investment returns. Women may need additional guidance on how to make investment choices that carry a certain amount of risk so that there is sufficient growth in their savings, particularly for retirement. This information could significantly enhance their retirement security.
- iii. Financial professionals and educators can also use the results from the household bargaining literature to better inform married couples about their financial options and the importance of not leaving the financial decisions entirely to one's spouse. Indeed, husbands and wives could achieve more efficient outcomes by cooperating in the financial planning process rather than by making independent choices.
- iv. Keeping in view of the legislative proposals, it is important that financial professionals and educators communicate to policymakers how the decision-making process within households can affect financial investments. The literature has shown decision-making power and respondents' characteristics can significantly affect their retirement savings decisions. Some investors are likely to be at greater risk than

others for being inadequately prepared for retirement.

CONCLUSION

The purpose of this study was to determine whether the variables such as demographic characteristics (age, profession, education and income) and investment patterns could be used individually or in combination to both differentiate among levels of men and women investment decisions and risk tolerance and develop some guidelines to suggest investors in their investment related activities. This research endeavor was successful in addressing the dual purpose of the study. First, the demographic characteristics were found to be effective in differentiating among men and women and second, studying the investment patterns of both the gender individually and in combination indicates the difference in their investment patterns. These findings may help the investment managers and differentiate them in their investment patterns.

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A CLASSICAL REVIEW ON PHYTOCHEMICAL, PHARMACOLOGICAL, CLINICAL, MOLECULAR BIOLOGICAL AND ANTIMICROBIAL STUDIES ON DOOB GRASS (CYNODON DACTYLON L. PERS).

Ashwani Kumar¹, Megha Rawat², Akansha Kushwaha³, Sachin Kumar³, Nisha Tyagi³

¹Dean, ²Student of Bioscience, ³Assistant Professor

Faculty of Biosciences

Shri Ram College, Muzaffarnagar

ABSTRACT

Cynodon dactylon (L.) Pers. Belongs to the family Poaceae, a perennial weedy grass is one of the ten auspicious herbs that constitute the group 'Dasapushpam' in Ayurveda. The species possesses immense therapeutic as well as other potential uses. As the species grow widely as weed, it is a natural resource which can be explored. Bermuda grass is a perennial grass distributed all over the world, and particularly it is native to the warm temperate and tropical regions. The plant has been rich in metabolites notably proteins, carbohydrates, minerals, flavonoids, carotenoids, alkaloids, glycosides and triterpenoides. Whole plant of cynodon dactylon keeps several biological activities such as antibacterial, antimicrobial, antiviral and wound healing properties. Furthermore, it has been extensively used in traditional medicines to treat varied ailments such as cough, headache, diarrhea, cramps, epilepsy, dropsy, dysentery, hemorrhage, hypertension, hysteria, measles, snakebite, sores, stones urogenital disorders, tumors, and warts. Therefore, based on the aforementioned consideration, this article reviews the most updated information of the antimicrobial, phytochemical properties and pharmacological effects of Cynodon dactylon extract, including its miscellaneous uses.

Keywords: Phytochemical, Pharmacological, Clinical, Molecular Biology, Antimicrobial, Doob grass, Cynodon dactylon, Bermuda grass, Antioxidant.

INTRODUCTION

Many weeds of our surroundings are often very powerful medicinal plants to address many of our today's major health problems. Cynodon dactylon (L.) Pers is a weedy grass (the generic name is derived from Greek word 'kuon' means dog and 'odous' means tooth, while the specific name from 'daktulos' means finger- refers to digitate inflorescence [1]. is one of the ten auspicious herbs that constitute the group 'Dasapushpam' in Ayurveda [2]. the science of life, prevention and longevity - the oldest and most holistic medical system). It is reported to be the most sacred plant of India next to Ocimum [3]. It possesses many therapeutic as well as decorative values and other unexplored potentials. Apart from its significant uses, the species is a natural resource and therefore

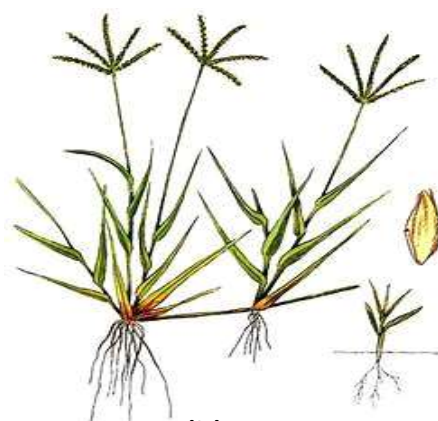
needs to be explored. With the view to it, an overview on Cynodon dactylon is presented providing adequate information which may be an impetus to researchers who can link the traditional knowledge about the species with the experimental (scientific) base enabling universal acceptance Medicinal plants are rich in several potential drugs and it holds healthier and harmless alternate to synthetic drugs [4]. Different parts such as leaf, root, stem, fruit, seed, and bark are used to obtain several phytochemical constituents. In addition, medicinal plants are rich in biologically active compounds and play an important role in drug discovery. Extracts of medicinal plants are useful in the treatment of several health problems such as bacterial infections [5].



(a)



(c)



(b)



(d)

Fig1: (a)- *Cynodon dactylon* plant with full bloom. (b)- *Cynodon dactylon* plant with roots and seed. (c)- *Cynodon dactylon* full plant having shoot and flower. (d)- *Cynodon dactylon* plant with flowers

Taxonomical classification: Kingdom: Plantae, Subkingdom: Tracheobionta, Super division: Spermatophyta, Division: Magneliophyta, Class: Liliopsida, Subclass: Commelinidae, Order: Cyperales, Family: Poaceae, Genus: *Cynodon*, Species: *Cynodon dactylon* [6].

Common names: Gewonekweek, Kweekgras; Arabic: Thael, Najeel, Echrish, Tohma; Chinese: Gou ya gen; English: Bahama grass, Bermuda grass, Common couch, Devil's grass, Giant Bermuda grass, Green couch, Hariali grass, Indian couch, Plain couch, Quick grass; French: Chiendent pied-de-poule, *Cynodon dactyle*, Grand chiendent; German: Bermudagrass, Hundezahngras; India: Dhub, Doob; Italian: Gramina; Portuguese: Capim-Bermuda; Spanish: Grama rastrera, Zacate de Bermuda; Swedish: Hundtandsgras [7].

Geographical distribution: Probably native to East Africa where it is widely distributed from sea

level to 2,160 m altitude. It was now distributed throughout the world in temperate and subtropical regions. In temperate zones, it grew along sea coasts; in tropics, most commonly in areas with 670-1750 mm rainfall; in arid zones along rivers and on irrigated land [8].

Biochemical composition; The plant contains crude proteins, carbohydrates and mineral constituents, oxides of magnesium, phosphorous, calcium, sodium and potassium. The whole plant affords sitosterol and carotene. Other compounds like vitamin C, cartone, palmitic acid, triterpenoides, alkaloids ergonovine and ergonovinine etc [9].

Scope and medicinal importance

The in vitro antibacterial evaluation of the leaves extract of *Cynodon dactylon* was carried out against *Escherichia coli*, *Staphylococcus aureus* and *Streptococcus pyogenes*. 10% concentration of extract was found to be most effective as

antibacterial concentration [10]. The aqueous extract of *Cynodon dactylon* (50-400 mg/ml) was used to determine the antimicrobial activity against *Pseudomonas aeruginosa*, *Escherichia coli*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Proteus mirabilis* and *Candida albicans* [11]. The hydroalcoholic extract of *Cynodon dactylon* was investigated for its antibacterial activity against two Gram positive bacteria (*Staphylococcus aureus* and *Staphylococcus albus*) and two gram-negative bacteria (*Escherichia coli* and *Pseudomonas aeruginosa*) using agar well diffusion method (zone of inhibition) and micro-dilution method (minimum inhibitory concentration). Hydroalcoholic extract of *Cynodon dactylon* possessed an effective antibacterial activity, from results of minimum inhibitory concentration, it appeared that all tested bacterial strains were sensitive to *Cynodon dactylon* extract [12]. The wound healing activity of hydroalcoholic extract of *Cynodon dactylon* was evaluated by using excision wound model. The parameters included the rate of wound contraction and the period of epithelization in excision wound model. Herbal ointment was prepared using different bases and concentrations 7.5% and 10% compared with standard cipladine (povidone-iodine). According to the healing parameters, the

topical application of hydrochloric extract of *Cynodon dactylon* promoted wound healing activity in excision model in rat [13]. Anticancer activity of *Cynodon dactylon* extract was evaluated in Swiss albino mice after inoculated with Ehrlich ascites carcinoma (EAC) cells. The extract was administered orally as three doses, 100, 200 and 400 mg/kg for ten consecutive days. Anticancer activity of the *Cynodon dactylon* extracts was evaluated by mice life span, which increased based on mean survival time (MST) [14]. The anticancer activity of methanolic extracts of leaves of *Cynodon dactylon* was studied in ascitic lymphoma (ELA) in Swiss albino mice. The result revealed that methanolic extract of *Cynodon dactylon* possessed significant antitumor and hepatoprotective effect [15].

2.1 CLINICAL, BIOMEDICAL AND ANTIMICROBIAL PROPERTIES OF CYNODON DACTYLON

Cynodon dactylon (Bermuda grass) is a perennial plant traditionally used as an herbal medicine in many countries. Treatment of HCD animals with *Cynodon dactylon* positively changed lipid profile by lowering of TC, TG and LDL-C. The results indicate that *Cynodon dactylon* prevents from early

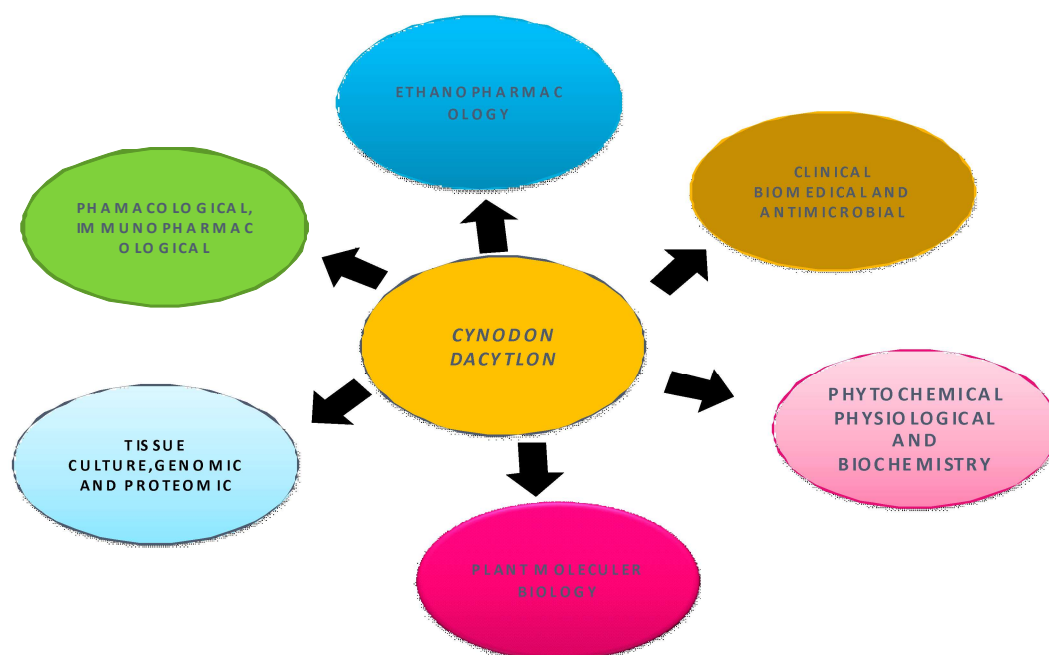


Fig 2: Flow chart showing various activities of *Cynodon dactylon* plant

atherosclerotic changes in the vessels wall [16]. Many Bermuda grass cultivars established for putting greens can be genetically unstable and lead to the occurrence of undesirable off-type grasses that vary in phenotype. Beginning in 2013, off-type and desirable hybrid bermudagrass samples were collected from golf course putting greens in the southeastern United States and genetically and phenotypically characterized using genotyping-by-sequencing and morphology. In addition, genotyping-by-sequencing was unable to genetically distinguish all standard cultivars from one another due to their similar origin and clonal propagation; Off-type grasses within golf course putting greens have the potential to compromise putting surface functionality and aesthetics [17].

The study defined the scientific evaluation of glycemic elements of extracts of *Cynodon dactylon* and *Musa paradisiaca*. A dose of 500 mg/kg body weight (bw) of *Cynodon dactylon* produced maximum falls of 23.2% and 22.8% in blood glucose levels of normoglycemic rats during studies of fasting blood glucose and glucose tolerance, respectively, whereas the same dose of *M. paradisiaca* produced a rise of 34.9% and 18.4%. Laser-induced breakdown spectroscopy used for detection of glycemic elements present in both the extracts indicated that *Cynodon dactylon* was rich in magnesium (Mg), whereas *M. paradisiaca* was rich in potassium (K) and sodium (Na), comparatively, suggesting thereby the defined roles of these elements in diabetes management [18]. *Cynodon dactylon* (Poaceae family) decoction was used in the treatment of kidney stones. However, no scientific study was undertaken so far to demonstrate the beneficial effect of the plant. Thus, the aim of the current study is to evaluate the effect of *Cynodon dactylon* aqueous extract as a preventive and curative agent in experimentally induced nephrolithiasis in a rat model. The most apparent beneficial effect of *Cynodon dactylon* extract was seen in kidney tissues where reduced levels of CaOx deposition have been noticed especially in medullary and papillary sections from treated rats. We concluded that *Cynodon dactylon*

extract has beneficial effect in preventing and eliminating CaOx deposition into kidneys. Such findings provide a scientific explanation for its use in the treatment of kidneys stones [19].

The rhizomes of *Cynodon dactylon* are used for the treatment of heart failure in folk medicine. Two weeks later, the animals were treated orally with different doses of the extract for fifteen days. At the end of the experiments cardiac functions and markers of myocardial hypertrophy were measured. The survival rate was high in the extract treated groups (90%). The results of this study indicated that *Cynodon dactylon* exerted a strong protective effect on right heart failure, in part by positive inotropic action and improving cardiac functions [20]. The aim of the study was to ascertain the role of ethanolic extract of *Cynodon dactylon* against hepatic complications in streptozotocin (STZ) induced type 2 diabetic models. Effect of the pre identified most effective dose of 500 mg/kg body weight was studied on hepatic injury caused by chemically induced diabetes by 55 mg/kg body weight i.p. injection of STZ in male Wistar rats [21]. Ethanolic extracts of *Cynodon dactylon*, *Aloe vera*, *Hemidesmus indicus* and *Coleus amboinicus* were tested for their toxicity effect on the third-instar larvae of *Anopheles stephensi*, *Culex quinquefasciatus* and *Aedes aegypti*. *Cynodon dactylon* showed the highest mortality rate against the three species of mosquito larvae in laboratory and field. The study proved that the extracts of *Cynodon dactylon*, *Aloe vera*, *H. indicus* and *Cynodon amboinicus* have both mosquitocidal and water sedimentation properties [22].

This paper studied the population density, morphological characteristics, and biomass and its allocation of *Cynodon dactylon* at different altitudinal sections of the hydro-fluctuation belt in Three Gorges Reservoir area, based on located observations. The unique adaption strategies of *Cynodon dactylon* to the flooding-drying habitat change in the shallow water section were the accelerated elongation growth and the increased stem biomass allocation, those in the deep water

section were the increased node number of primary and secondary branches, increased number of the branches, and increased leaf biomass allocation, whereas the common strategies in the shallow and deep water sections were the accelerated root growth and the increased tillering and underground biomass allocation for preparing nutrition and energy for the rapid growth in terrestrial environment [23]. Many methods of synthesizing silver nanoparticles (Ag-NPs) by reducing Ag⁺ ions using aqueous/organic extracts of various plants have been reported in the past, but the methods are rather slow. In this investigation, silver nanoparticles were quickly synthesized from aqueous silver nitrate through a simple method using leaf extract of a plant *Cynodon dactylon* which served as reducing agent, while sunlight acted as a catalyst. The formation of Ag-NPs was indicated by gradual change in colour and pH and confirmed by ultraviolet--visible spectroscopy. The synthesized Ag-NPs also demonstrated their antibacterial activity against *Escherichia coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Salmonella typhimurium* [24]. New investigations are in progress to find some alternative treatments for diabetes mellitus. Herbs are some of the interesting medications in this regard. *Cynodon dactylon* is a potential plant to be considered as a new medication. On the other hand, the effect of the Electromagnetic Field (EMF) on bio organisms is becoming clearer. In this study, the effect of C.d, EMF and insulin have been investigated on the diabetic mouse. [25].

Cynodon dactylon is a potential source of metabolites such as flavanoids, alkaloids, glycosides and β -sitosterol and has been traditionally employed to treat urinary tract and other microbial infections and dysentery. The present work attempts to evaluate the activity of *Cynodon dactylon* extracts for glycemic control. These residues have been proven to be responsible for sugar sensing and transport. This work establishes *Cynodon dactylon* extract as a potential SGLT2 inhibitor for diabetic neuropathy thus enabling a possibility of this plant extract as a new alternative to existing diabetic

approaches [26]. Metabolic responses to cadmium (Cd) may be associated with variations in Cd tolerance in plants. The objectives of this study were to examine changes in metabolic profiles in Bermuda grass in response to Cd stress and to identify predominant metabolites associated with differential Cd tolerance using gas chromatography-mass spectrometry. The differential accumulation of these metabolites could be associated with the differential Cd tolerance in Bermuda grass [27].

2.2 PHYTOCHEMICAL, PHYSIOLOGICAL AND BIOCHEMICAL ASPECTS

Bermuda grass (*Cynodon dactylon* L.) is a prominent warm-season turf and forage grass species with multiple applications. In most *Cynodon dactylon* cultivars and accessions, erect-growing stems (shoot) and prostrate-growing stems (stolon) often coexist. These two types of stems are both formed through tillering but grow in two directions with different tiller angles. These results not only expand our understanding of the genetic control of tiller angle and stem growth direction in Bermuda grass but also provide insight for future molecular breeding of *Cynodon dactylon* and other turfgrass species with different plant architectures [28]. Moreover, the intracellular effect of NaCl on the photosynthetic apparatus was found to be lower in *Cynodon dactylon* in comparison to rice; at the same time, the vacuolization process increased in the former. Accumulation of osmolytes like proline and glycine betaine also increased significantly in *Cynodon dactylon* with a concurrent check on the H₂O₂ levels, electrolyte leakage and membrane lipid peroxidation. Thus, the comparative analyses of the expression pattern of the plasma membrane and tonoplast Na⁺ ion transporters, SOS1 and NHX in both the plants revealed the significant role of these two ion transporters in conferring salinity tolerance in *Cynodon dactylon* [29]. Fundamental processes involved in the microbial degradation of coal and its derivatives have been well documented. A mutualistic interaction between plant roots and certain microorganisms to aid growth of plants such as *Cynodon dactylon* (Bermuda grass) on hard coal dumps has recently been suggested. In the present

study coal bioconversion activity of nonmycorrhizal fungi was investigated in the *Cynodon dactylon*/coal rhizosphere. These findings suggest a phyto-bioconversion of hard coal involving plant and microbes occurring in the rhizosphere to promote the growth of *Cynodon dactylon*. An understanding of this relationship can serve as a benchmark for coal dumps rehabilitation as well as for the industrial scale bioprocessing of hard coal [30].

Tremorgenic syndromes in mammals are commonly associated with indole-diterpenoid alkaloids of fungal origin. Cattle are sometimes affected by tremors (also called "staggers") when they graze on toxic grass pastures, and Bermuda grass (*Cynodon dactylon*, kweek) has been known to be associated with tremors for several decades. This study reports the identification of paspalitrems and paspaline-like indole-diterpenes in the seedheads of *Claviceps cynodontis* -infected Bermuda grass collected from a pasture that had caused a staggers syndrome in cattle in South Africa and thereby links the condition to specific mycotoxins. This is the first study linking tremors associated with grazing of Bermuda grass to specific tremorgenic indole-diterpenoid mycotoxins [31]. The study was conducted to examine differential proteomic responses to water-deficit stress in hybrid Bermuda grass (*Cynodon dactylon* (L.) Pers. × *Cynodon transvaalensis* Burt Davy, cv. Tifway) and common Bermuda grass (*Cynodon dactylon*, cv. C299). Plants were exposed to water-deficit stress for 15 days by withholding irrigation in a growth chamber. Total proteins of leaves were extracted from well-watered and water-deficit plants and separated by two-dimensional gel electrophoresis. Of the 750 protein spots reproducibly detected, 32 proteins had increases in the abundance and 22 proteins exhibited decreases in the abundance in at least one genotype under water-deficit stress. [32]. Growth chamber and field experiments were carried out to determine the effects of extended photoperiod under low and freezing temperatures on bermuda grass turf dormancy at Bajgah, in the southern part of Iran. Decreasing the temperature and light duration increased electrolyte leakage and proline content.

Practically, the problem of Bermuda grass turf's dormancy could be solved via increasing the photoperiod in months with short day lengths. This treatment would be efficient and useful for turfgrass managers to apply in landscapes and stadiums [33].

Bermuda grass (*Cynodon dactylon*) is a widely used warm-season turfgrass and one of the most drought tolerant species. Dissecting the natural variation in drought tolerance and physiological responses will bring us powerful basis and novel insight for plant breeding. In the present study, we evaluated the natural variation of drought tolerance among nine Bermuda grass varieties by measuring physiological responses after drought stress treatment through withholding water. [34]. Nitric oxide (NO) and hydrogen sulfide (H₂S) are important gaseous molecules, serving as important secondary messengers in plant response to various biotic and abiotic stresses. Taken together, we assigned the protective roles of endogenous and exogenous NO and H₂S in Bermuda grass response to cadmium stress, and speculated that NO-activated H₂S might be essential for cadmium stress response in bermudagrass [35]. As a gaseous molecule, hydrogen sulfide (H₂S) has been recently found to be involved in plant responses to multiple abiotic stress. In this study, salt (150 and 300 mM NaCl), osmotic (15% and 30% PEG6000) and cold (4 °C) stress treatments induced accumulation of endogenous H₂S level, indicating that H₂S might play a role in Bermuda grass responses to salt, osmotic and cold stresses. Taken together, all these data indicated the protective roles of H₂S in Bermuda grass responses to salt, osmotic and freezing stresses, via activation of the antioxidant response and osmolyte accumulation. These findings might be applicable to grass and crop engineering to improve abiotic stress tolerance [36].

Drought (water-deficit) stress is a serious environmental problem in plant growth and cultivation. As one of widely cultivated warm-season turfgrass, Bermuda grass (*Cynodon dactylon* (L.) Pers.) exhibits drastic natural variation in the drought stress resistance in leaves and stems of

different varieties. Through comparative proteomic analysis, 39 proteins with significantly changed abundance were identified, including 3 commonly increased and 2 decreased proteins by drought stress in leaves and stems of Yukon and Tifgreen varieties, 2 differentially regulated proteins in leaves and stems of two varieties after drought treatment, 23 proteins increased by drought stress in Yukon variety and constitutively expressed in Tifgreen variety, and other 3 differentially expressed proteins under control and drought stress conditions. These studies provide new insights to understand the molecular mechanism underlying bermudagrass response to drought stress [37]. Sulfur dioxide (SO₂), a major air pollutant in developing countries, is highly toxic to plants. To achieve better air quality and landscape, planting appropriate grass species in severe SO₂ polluted areas is very critical. *Cynodon dactylon*, a widely used warm season turfgrass species, has good SO₂-tolerant ability. Our results revealed that SO₂-tolerant *Cynodon dactylon* accessions showed higher soluble sugar, proline, and chlorophyll a contents under both SO₂ treated and untreated conditions; higher chlorophyll b and carotenoid under SO₂ treated condition; lower reactive oxygen species (ROS) level, oxidative damages, and superoxide dismutase (SOD) activities under SO₂ treated condition; and higher peroxidase (POD) activities under SO₂ untreated condition. [38].

Melatonin (N-acetyl-5-methoxytryptamine), a well-known animal hormone, is also involved in plant development and abiotic stress responses. In this study, it is shown that exogenous application of melatonin conferred improved salt, drought, and cold stress resistances in Bermuda grass. Moreover, exogenous melatonin treatment alleviated reactive oxygen species (ROS) burst and cell damage induced by abiotic stress; this involved activation of several antioxidants. Taken together, this study provides the first evidence of the protective roles of exogenous melatonin in the Bermuda grass response to abiotic stresses, partially via activation of antioxidants and modulation of metabolic homeostasis. [39]. Phytoremediation utilizing plants

and microbes has been increasingly adopted as a green technology for cleaning up heavy metal polluted soils. Cd polluted soil and native Bermudagrass from Liuyang and Zhuzhou in Hunan province of China were collected to investigate microbial diversity and isolate Cd resistant fungi, and then to determine the effect of Cd resistant fungi on Cd tolerance and transportation of bermudagrass. However, inoculation of *A. aculeatus* increased root Cd concentration under Cd stress conditions, significantly elevated soil pH, and decreased soil water-soluble Cd concentration. These results suggested that *A. aculeatus* might be potentially applied to improve Cd tolerance and to reduce Cd transportation to shoot of bermudagrass [40].

Salt glands are specialized organelles present in the leaf tissues of halophytes, which impart salt-tolerance capability to the plant species. Scanning electrochemical microscopy performed in sodium chloride medium in the presence and absence of potassium ferrocyanide as redox mediator, reveals the identity of salt glands. The protocol could be used to understand the developmental processes in plants grown in different soil/water conditions in order to improve salt tolerance of food crops by genetic engineering and hence improve their agricultural productivity [41]. P-coumaric acid is a nonflavonoid phenolic acid and is a major constituent of the species *Cynodon dactylon* Linn. (Pers) In this study isolation of P-coumaric acid was achieved by preparative TLC and the compound thus isolated was characterised by UV, mass, and ¹H NMR spectral analysis. This method has obeyed linearity over the concentration range of 2-10 µg/mL and the regression coefficient obtained from linearity plot for P-coumaric acid was found to be 0.999. RP-HPLC method was validated in pursuance of ICH guidelines [42]. The fact of melatonin as an important antioxidant in animals led plant researchers to speculate that melatonin also acts in the similar manner in plants. Although melatonin has significant effects on alleviating stress-triggered reactive oxygen species (ROS), the involvement of melatonin in direct oxidative stress

and the underlying physiological and molecular mechanisms remain unclear in plants. Taken together, this study provides more comprehensive insights into the physiological and molecular mechanisms of melatonin in Bermuda grass responses to direct oxidative stress [43].

2.3 PLANT MOLECULAR BIOLOGY, TISSUE CULTURE, GENOMIC AND PROTEOMIC BEHAVIOUR OF CYNODON DACTYLON

Water deficit is one of the main abiotic factors that affect plant productivity in subtropical regions. To identify genes induced during the water stress response in Bermuda grass (*Cynodon dactylon*), cDNA macroarrays were used. The macroarray analysis identified 189 drought-responsive candidate genes from *Cynodon dactylon*, of which 120 were up-regulated and 69 were down-regulated. The candidate genes were classified into seven groups by cluster analysis of expression levels across two intensities and three durations of imposed stress. The functional classification of gene ontology (GO) was consistent with the BLASTX results, also suggesting some crosstalk between abiotic and biotic stress. Comparative analysis of cis-regulatory elements from the candidate genes implicated specific elements in drought response in Bermuda grass. Although only a subset of genes was studied, Bermuda grass shared many drought-responsive genes and cis-regulatory elements with other botanical models, supporting a strategy of cross-taxon application of drought-responsive genes, regulatory cues, and physiological-genetic information [44]. The main goals of the present study were to screen Iranian common Bermuda grasses to find cold-tolerant accessions and evaluate their genetic and morphological variabilities. In this study, 49 accessions were collected from 18 provinces of Iran. Data from morphological traits were evaluated to categorize all accessions as either cold sensitive or tolerant using hierarchical clustering with Ward's method in SPSS software. This study may provide useful information for further breeding programs on common Bermuda grass. Selected genotypes can be evaluated for other

abiotic stresses such as drought and salinity [45]. This grass has a long connection with human culture but its systematics is relatively under studied. Additionally, our *in silico* analyses identified 10 sets of repeats longer than 20 bp and predicted the presence of 36 RNA editing sites. Our phylogenetic character mapping based on the parsimony principle further indicated that the loss of the *accD* gene and *clpP* introns, the pseudogenization of four *ycf* genes, and the two rearrangements occurred only once after the most recent common ancestor of the Poaceae diverged from other monocots, which could explain the unusual long branch leading to the Poaceae when phylogeny is inferred based on chloroplast sequences [46]. By the method of randomly digging up whole ramet tuft while maintaining natural integrity, large samples of *Cynodon dactylon* clones were collected from a grape orchard abandoned for 2 years without any management in the Yili River Valley Plain of Xinjiang, aimed to quantitatively analyze the growth patterns of their modules. The results showed that the average ramet number of test 30 clones reached 272.6 ± 186.6 , among which, vegetative ramets occupied 82.3%, being 4.3 times higher than reproductive ones [47]. It is found everywhere, even on waste land, road side, dry places, and spreads vigorously on cultivated ground. This study was carried out with an objective to test if the constituents of this plant are useful in coping stress-induced sexual In this study, we considered immobilization stress to induce male infertility and the effect of *Cynodon dactylon* in restoration of the dysfunction was evaluated by considering sexual behavioral observations, sexual performance, fructose content of the seminal vesicles, epididymal sperm concentration and histopathological examinations as parameters. We conclude that active constituents of *Cynodon dactylon* present in methanolic extract have a potent aphrodisiac and male fertility activity [48].

Polyamines conferred enhanced abiotic stress tolerance in multiple plant species. However, the effect of polyamines on abiotic stress and physiological change in bermudagrass, the most

widely used warm-season turfgrasses, are unknown. In this study, pretreatment of exogenous polyamine conferred increased salt and drought tolerances in Bermuda grass. These findings might be applicable for genetically engineering of grasses and crops to improve stress tolerance [49]. Although *Cynodon dactylon* is widely distributed in China, information on its genetic diversity within the germplasm pool is limited. Fifteen primer pairs were used to amplify specific *Cynodon dactylon* genomic sequences. A total of 481 SRAP fragments were generated, with fragment sizes ranging from 260-1800 base pairs (bp). Genetic similarity coefficients (GSC) among the 430 accessions averaged 0.72 and ranged from 0.53-0.96. Cluster analysis conducted by two methods, namely the unweighted pair-group method with arithmetic averages (UPGMA) and principle coordinate analysis (PCoA), separated the accessions into eight distinct groups. Our findings verify that Chinese *Cynodon dactylon* germplasms have rich genetic diversity, which is an excellent basis for *Cynodon dactylon* breeding for new cultivars [50]. *Cynodon dactylon* (L.) is a potent medicinal plant in the traditional and current Indian medicinal systems. The objective of this research was to find out the levels of flavonoids, carotenoids and chlorophyll b in *Cynodon dactylon* leaves by high-performance liquid chromatography (HPLC) equipped with a diode array detector. HPLC analysis revealed that total carotenoid and total flavonoid concentration were 62 mg/100 g and 249.1 µg/g, respectively. The results of this investigation should be useful information for further pharmacological studies [51].

The present study was designed to investigate the ameliorating effect of aqueous extract of *Cynodon dactylon* on carbofuran induced oxidative stress (OS) and alterations in the activity of acetylcholinesterase (AChE) in the brain of rats. Carbofuran treatment significantly increased the activities of SOD and CAT by 75 and 60%, respectively. The results suggest that the study is extremely important in the context of development of new anticholinesterase and antioxidant antidotes against carbofuran from *Cynodon*

dactylon [52]. Bioactive chemicals isolated from plants have attracted considerable attention over the years and overwhelmingly increasing laboratory findings are emphasizing on tumor suppressing properties of these natural agents in genetically and chemically induced animal carcinogenesis models. We studied in vitro anticancer activity of organic extracts of *Cynodon dactylon* and *Oxalis corniculata* on Hep2 cell line and it was compared with normal human corneal epithelial cells (HCEC) by using MTT assay. DNA fragmentation assay was also carried out to note DNA damaging effects of the extracts. Moreover, DNA damaging effects were also not detected in treated cancer cell line. Anticancer activity of these plants on the cancer cell line showed the presence of anticancer components which should be characterized to be used as anticancer therapy [53]. The Anthelmintic activities of different extracts of aerial parts of *Cynodon dactylon* Pers were evaluated separately on adult Indian earthworm (*Pheritima posthuma*). It was found that petroleum ether (PECD), chloroform (CECD), ethanol (EECD), aqueous extract (AECD) of *Cynodon dactylon* showed anthelmintic activities at the concentration of 5 mg/ml of each. [54].

As an important second messenger, calcium is involved in plant cold stress response, including chilling (<20 °C) and freezing (<0 °C). In this study, exogenous application of calcium chloride (CaCl₂) improved both chilling and freezing stress tolerances, while ethylene glycol-bis-(2-aminoethyl) ether-N,N,N,N-tetraacetic acid (EGTA) reversed CaCl₂ effects in bermudagrass. Physiological analyses showed that CaCl₂ treatment alleviated the reactive oxygen species (ROS) burst and cell damage triggered by chilling stress, via activating antioxidant enzymes, non-enzymatic glutathione antioxidant pool, while EGTA treatment had the opposite effects. Additionally, comparative proteomic analysis identified 51 differentially expressed proteins that were enriched in redox, tricarboxylic acid cycle, glycolysis, photosynthesis, oxidative pentose phosphate pathway, and amino acid metabolisms [55]. *Cynodon dactylon* (L.)

(Poaceae) is traditionally used herb to treat fevers, skin diseases and rheumatic affections. The ethanolic extract of *Cynodon dactylon* was found to be safe at all the dose levels (100, 200 and 400 mg/kg, orally) and there was no mortality up to the dose of 5000 mg/kg of extract when administered orally. All the above results support the traditional uses of the plant in the treatment of rheumatoid arthritis [56]. Salinity is one of the major environmental factors affecting plant growth and survival by modifying source and sink relationships at physiological and metabolic levels. Individual metabolite levels and/or ratios in sink and source tissues may reflect the complex interplay of metabolic activities in sink and source tissues at the whole-plant level. This trait could be considered in breeding programs for increasing salt tolerance, which would help maintain root functioning (i.e. water and nutrient absorption, Na⁺ exclusion) and adaptation to stress [57].

Many flooding-tolerant species are clonal plants; however, the effects of physiological integration on plant responses to flooding have received limited attention. Physiological integration relieved growth inhibition, carbohydrate accumulation and induction of antioxidant enzyme activity in stressed ramets, as expected, without any observable cost in unstressed ramets. We speculate that relief of flooding stress in clonal plants may rely on oxidising power and electron acceptors transferred between ramets through physiological integration [58]. Cold stress is regarded as a key factor limiting widespread use for Bermuda grass (*Cynodon dactylon*). Therefore, to improve cold tolerance for Bermuda grass, it is urgent to understand molecular mechanisms of Bermuda grass response to cold stress. However, our knowledge about the molecular responses of this species to cold stress is largely unknown. The results of this study may contribute to our understanding the molecular mechanism underlying the responses of Bermuda grass to cold stress, and also provide important clues for further study and in-depth characterization of cold-resistance breeding candidate genes in Bermuda grass [59]. In this study, we investigated the mechanisms by which Bermuda grass

withstands the drought and submergence stresses through physiological, proteomic and metabolomic approaches. The results showed that significant physiological changes were observed after drought treatment, while only slight changes after submergence treatment, including compatible solute contents, ROS levels and antioxidant enzyme activities. [60].

Research to date has confirmed 2,4-D residues may dislodge from turfgrass; however, experiments have not been conducted on hybrid bermudagrass (*Cynodon dactylon* L. x *C. transvaalensis*), the most common athletic field turfgrass in subtropical climates. This research will improve turfgrass management practices and research designed to minimize human 2,4-D exposure [61]. A Significant diminution of fasting blood sugar level was observed and also significant increase in HDL and decrease ($P<0.05$) in cholesterol, triglyceride, LDL and VLDL were observed after 15 days of treatment [62]. The aim of the present study was to screen cardioactive herbs from Western Ghats of India. In addition, the extracts exhibited no chemical genetic effects in the drug dosage range tested. In conclusion, we developed an assay that can measure changes in cardiac function in response to herbal small molecules and determine the cardiogenic effects by microvideography [63].

The in vitro virustatic and virucidal tests of the crude extract of *Cynodon dactylon* against infection with porcine reproductive and respiratory syndrome virus (PRRSV), a cause of major devastating pig disease, were described. *Cynodon dactylon* also inactivated PRRSV as determined by immunoperoxidase monolayer assay (IPMA) compared to the control experiments. In summary, the present study may be among the earliest studies to describe virustatic and virucidal activities of *Cynodon dactylon* crude extract against PRRSV in vitro. Extracts of *Cynodon dactylon* may be useful for PRRSV control and prevention on pig farms [64]. To obtain luteolin and apigenin rich fraction from the ethanolic extract of *Cynodon dactylon* (L.) Pers and evaluate the fraction's

cytotoxicity and anti-Chikungunya potential using Vero cells. Reverse phase-HPLC and GC-MS studies were carried out to identify the major phytochemicals in the fraction using phytochemical standards. RT-PCR analyses indicated that the reduction in viral mRNA synthesis in fraction treated infected cells was much higher than the viral infected control cells. Luteolin and apigenin rich ethanolic fraction from *Cynodon dactylon* can be utilized as a potential therapeutic agent against CHIKV infection as the fraction does not show cytotoxicity while inhibiting the virus [65]. The antioxidant capacity impairs in kidney and urinary bladder of animals with stone disease. Herbal medicine can improve the antioxidant condition of renal tissue. *Cynodon dactylon* is a medicinal plant with antioxidative and diuretic properties and different preparations of this plant have shown promising effects in stone disease. *Cynodon dactylon* reduced stone formation and simultaneously increased total antioxidant power of serum and preserved MDA content and water [66].

2.4 PHARMACOLOGICAL, IMMUNOPHARMACOLOGICAL AND ETHANOPHARMACOL OF CYNODON DACTYLON

The effects of copper accumulation and resistance in two biotypes of *Cynodon dactylon* were studied. Results showed that at a low concentration of copper (<100 mg/kg), the growth of *Cynodon dactylon* was generally unaffected. The critical concentration at which the plant exhibited poisoning symptoms was different for the two biotypes of *Cynodon dactylon*. At 500 mg/kg copper concentration in soil, the biotype from the polluted area showed significantly higher tolerance of copper than the biotype from the unpolluted area [67]. The present study was aimed at evaluating the chemopreventive property of *Cynodon dactylon*. In vivo chemopreventive property of the plant extract was studied in DMH-induced colon carcinogenesis. Treatment with methanolic extract of *Cynodon dactylon* increased the levels of antioxidant enzymes and reduced the number of dysplastic crypts in DMH-induced colon of albino

rats. The present investigation revealed the anticancer potential of methanolic extract of *Cynodon dactylon* in COLO 320 DM cells and experimentally induced colon carcinogenesis in rats [68]. *Cynodon dactylon* is one of the 10 auspicious herbs that constitute the group Dasapushpam in Ayurveda. Traditionally *Cynodon dactylon* L. is used against many chronic inflammatory diseases in India. A significant increase in the levels of inflammatory mediators, myeloperoxidase, nitrite, C-reactive protein, ceruloplasmin was observed. *Cynodon dactylon* (20mg/kg/b.wt) was orally administered to arthritic rats after adjuvant injection produced a significant attenuation in the inflammatory response, oxidative stress and ameliorated the arthritic changes to near normal conditions. Hence, the results of this study clearly indicate that *Cynodon dactylon* extract has a promising protective role against arthritis [69].

Indian major carp (*Catla catla*) was subjected to study the immunostimulatory effects when the grass *Cynodon dactylon* (L.) ethanolic extract administered as feed supplement. The results indicate that *Cynodon dactylon* ethanolic extract administered as feed supplement significantly ($P < 0.05$) enhanced most of the non-specific immune parameters tested. All these experimental results prove that *Cynodon dactylon* ethanolic extract enhances the immunity of *Catla* fish [70]. Cadmium (Cd) is one of the most toxic pollutants that caused severe threats to animal and human health. Bermuda grass is a dominant species in Cd contaminated soils, which can prevent Cd flow and spread. Phylogenetic analysis revealed that the majority of accessions from the same or adjacent regions were clustered into the same groups or subgroups, and the accessions with similar cadmium tolerance displayed a close phylogenetic relationship. Screening genetically diverse germplasm by combining the physiological traits and molecular markers could prove useful in developing Cd-tolerant Bermuda grass for the remediation of mill tailings and heavy metal polluted soils [71]. In a greenhouse pot experiment, dandelion (*Taraxacum platyepidum* Diels.) and bermudagrass (*Cynodon*

dactylon (Linn.) Pers.), inoculated with and without arbuscular mycorrhizal fungus (AMF) *Rhizophagus irregularis*, were grown in chromium (Cr)-amended soils (0 mg/kg, 5 mg/kg, 10 mg/kg, and 20 mg/kg Cr(VI) to test whether arbuscular mycorrhizal (AM) symbiosis can improve Cr tolerance in different plant species. The study confirmed the protective effects of AMF on host plants under Cr contaminations [72].

Moreover, its anti-diabetic, anti-cancer and anti-microbial properties have been also reported. Concerning the critical role of angiogenesis in the incidence and progression of tumors and also its protective role in cardiovascular diseases, we investigated the effects of the aqueous extract prepared from the rhizomes of *Cynodon dactylon* on vascular endothelial growth factor (VEGF) expressions in Human Umbilical Vein Endothelial Cells (HUVECs) and also on angiogenesis in carrageenan induced air-pouch model in rats. In the air-pouch model, carrageenan was injected into an air-pouch on the back of the rats and following an IV injection of carmine red dye on day 6, granulation tissue was processed for the assessment of the dye content [73]. Yuma Proving Grounds (YPG) in western Arizona is a testing range where Depleted uranium (DU) penetrators have been historically fired. A portion of the fired DU penetrators are being managed under controlled conditions by leaving them in place. The widespread use of DU in armor-penetrating weapons has raised environmental and human health concerns. The present study is focused on the onsite management approach and on the potential interactions with plants local to YPG. The results of this study show a much lower threshold for biomass toxicity and higher plant concentrations, particularly in the roots than shoots, compared to previous studies [74]. The homologous group of sweet grasses belongs to the Pooideae subfamily, but grass pollen species from other subfamilies can also cause allergy, such as *Cynodon dactylon* (Chloridoideae) and *Phragmites communis* (Arundinoideae). *Cynodon dactylon* and *P. communis* have not been included in the sweet grasses homologous group because of their low

cross-reactivity with other grasses. The aims of this study were to investigate the profile of sensitization to *Cynodon dactylon* and *P. communis* in patients sensitized to grasses and to analyze cross-reactivity between these 2 species and temperate grasses. Patients were skin prick tested with a grass mixture (GM). When *Cynodon dactylon* or *P. communis* were used in the solid phase, GM produced almost complete inhibition. Eighty percent of patients sensitized to grasses were also sensitized to *Cynodon dactylon* and 90% were sensitized to *P. communis*. Sensitization to these species seems to be induced by allergens different to those in sweet grasses [75].

Fresh juice of *Cynodon dactylon* known as 'durva' grass is employed in India as a rejuvenator and for wound healing. To validate the traditional use of the herb through evaluation of DNA protective activity in vitro and immunomodulatory activity in vivo. Fresh juice of the grass was prepared as indicated for use in traditional medicine and standardized for solid content. Its total phenol content was estimated by Folin-Ciocalteu method. Freshly prepared juice was investigated for its effect on doxorubicin-induced DNA damage in vitro. [76]. The aim of the present study is to evaluate the diuretic potential and effect on urinary electrolytes of aqueous *Erica multiflora* L. (Ericaceae) flowers and *Cynodon dactylon* L. (Poaceae) rhizomes extracts in rats. Furthermore, a toxicological effect of both plants was undertaken as well. The results showed that furosemide induced significant diuresis and electrolytes excretion during the first hours. We concluded that both aqueous herb extracts administered, particularly, at the dose of 0.500 g/kg induce significant effect on urinary output of water and electrolytes and justify their use as diuretic remedy in traditional medicine [77]. The Publisher regrets that this article is an accidental duplication of an article that has already been published, <http://dx.doi.org/10.1016/j.bionut.2010.09.001>. The duplicate article has therefore been withdrawn [78].

To study the ability of the secondary metabolites of

Cynodon dactylon to serve as an antagonist to angiotensin II type 1 receptor (AT(1)); activation of this receptor plays a vital role in diabetic retinopathy (DR). In silico methods are mainly harnessed to reduce time, cost and risk associated with drug discovery. Twenty-four compounds were identified as the secondary metabolites of hydroalcoholic extract of *Cynodon dactylon* using the GCMS technique. The present study shows that the metabolites of *Cynodon dactylon* could serve as a natural antagonist to AT (1) that could be used to treat diabetic retinopathy [79]. In the traditional medicine, *Cynodon dactylon* (Linn.) is used in asthma, but scientific studies to provide evidence for medicinal uses are sparse. The chloroform extract of *Cynodon dactylon* (CECD) protected against Ach-induced bronchospasm in guinea pigs, similar to atropine. The phosphodiesterase (PDE) inhibitory activity was confirmed by direct evidence of potentiation of isoprenaline-induced inhibitory response, similar to papaverine. These results suggest that the bronchodilator activity of CECD is partly due to presence of scopoletin, and mediated possibly through CCB and PDE inhibition [80]. In the traditional medicine, *Cynodon dactylon* (Linn.) is used in asthma, but scientific studies to provide evidence for medicinal uses are sparse. Thus this study was undertaken to provide evidence for medicinal use in asthma as a bronchodilator, and to identify active ingredient(s). These results suggest that the bronchodilator activity of CECD is partly due to presence of scopoletin, and mediated possibly through CCB and PDE inhibition [81]. The extraction of plants parts (datura seed and fruit pulp) and areal parts of durva was carried out using Soxhlet and cold extraction method using solvents namely methanol and distilled water. In the present study we observed a positive correlation was between the phenolic and flavanoid content of the *Datura metel* and *cynodon doctylon* (durva) extracts with the free radical scavenging activities. Both were found to have a high antioxidant activity [82].

2.5 MISCELLANEOUS

Bermuda grass (*Cynodon dactylon* (L.) Pers.) an important turfgrass used in public parks, home

lawns, golf courses and sports fields, is widely distributed in China. In the present study, sequence-related amplified polymorphism (SRAP) markers were used to assess genetic diversity and population structure among 157 indigenous Bermuda grass genotypes from 20 provinces in China [83]. Many naturally occurring oligostilbenes have drawn considerable attention because of their intricate structures and diverse bioactivities. The isolation and structures elucidation of two new stilbene trimers suggested the ordinary grass belonging to the family Poaceae may be a rich source of stilbene oligomers [84]. Observations were made on vertical migration patterns of *Haemonchus contortus* infective larvae on *Cynodon dactylon* (Bermuda grass) and *Paspalum notatum* (bahiagrass) pastures under summer climatic conditions typical of East Texas. The log transformed larval recovery data were analyzed for effect of day, stratum, and day x stratum interaction for each grass species during two separate experimental periods. While the design of this study did not allow for testing one pasture species against another, studies with potted plants would allow for some valid comparisons. Soil characteristics may also play a role in L3 survival and subsequent migration [85].

CONCLUSION

In recent years, treating various diseases with natural herbal products increased. Several studies showed clear evidence that *Cynodon dactylon* is a natural crude drug having a widespread of biological, clinical, phytochemical and pharmacological functions. Therefore, it is anticipated that it may be used as a novel drug in the near future to control many diseases like as anticancer, antiulcer as the species is a weedy grass and cultivation is not an essentiality, therefore the species may easily be explored for human benefits from natural habitat. The present endeavor provides information which may generate interest among researchers to explore such natural resources. *Cynodon dactylon* has widely been used in Indian ayurvedic medicine since ancient times for curing several human diseases. Aqueous extract of whole plant, aerial parts, leaves and rhizomes of *cynodon*

dactylon has abundant medicinal and clinical applications which can be made only after large-scale research on its pharmacological activity, mechanism, bioactivity and extensive safety studies. Nevertheless, the determined research studies are going and it would be at ease to develop new drugs for antidiabetics, antimicrobial, antiviral and wound healing.

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AUTHOR CONTRIBUTIONS

This work was carried out in collaboration between all authors. Author managed the literature searches. All authors read and approved the final manuscript.

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COMPARISON OF ENERGY EFFICIENT CLUSTERING BASED ON DISTANCE IN WIRELESS SENSOR NETWORK

Bhawmesh Kumar¹, Dr. Vinit Kumar Sharma²

¹Research Scholar, Mewar University, Chittorgarh, Rajasthan

²Associate Professor, Shri Ram College, Muzaffargarh, U.P.

¹bhawmeshmca@gmail.com, 2vksharmaraj@gmail.com

ABSTRACT

Sensor network is vast field to have some researches. Here WSN is base concept in the different aspects of computer science. How the network can be decide to spread the node inside the network and placement of each node will be application specific. Each node has own battery backup which charge by solar panel, that battery backup is known as residual energy of node, which is useful to transmit the data from the environment to the BS or main computer system. The clustering is beneficial for the energy based approaches. Energy consumption improves the life time of the sensor network. This paper shows that less distance coverage gives the better result for the improvement of the network. Energy formula is based on the distance covered for the transmission of data.

Keywords: sensor node, clustering, cluster head, energy efficiency

INTRODUCTION

Wireless Sensor Network (WSN) is a collection of distinguish node (i.e homogeneous or heterogeneous). Each node is connected to main system of network known as base station (BS). BS is main controller or heart of whole WSN, can send or receive the data to all connected nodes. In so many years an energy efficient approach[1] of WSN is leading field of research. A sensor is a node that takes some input from two field of physical or environmental condition[2]. And output form of sensor node is electrical pulse that is sends to the base station for ahead processing.

Different topologies[3] used to generates sensor networks. And numbers of nodes used is depends on the area or size of space, where battery backup is main role perform to maintain the network whole life cycle. If each node has enough battery backup that able to transmit the enough data, that data transmit the distance from some to destination with usage of energy. Now energy is main concern of networks which should be in consideration. So need to emphasis on battery or remains energy or residual

energy saving of whole networks. When deployment of nodes into hostile environment[4] really very typical, so not easy to reboot or recharge or regenerate the replacement of battery of each and every node is named as mote or hub seen in researches, but need to focus on energy usage of each node.

Clustering is way to divide the whole network into small clusters so easy way to handle. Through clustering energy can be used efficiently. All the node should have own cluster head where as each node become the cluster member of corresponding cluster. Now in this situation cluster member communicates to cluster head and cluster head further transmit the data to base station (BS).

Figure 1 shows, WSN is a network that has so many scattered nodes to work collectively just receive input from field (information gathering), nodes are linked together wirelessly to form a network topologies. WSN has two things: firstly, cluster of nodes connected to each other and second one is base station. Each node has a main device to be

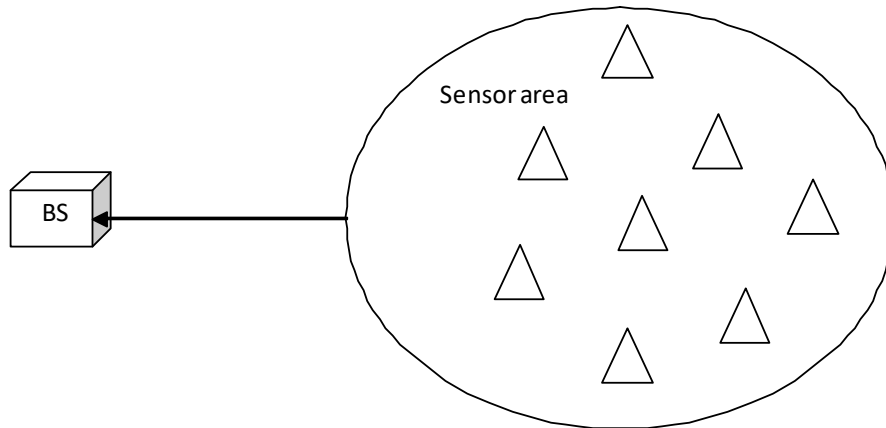


Figure 1: Wireless Sensor Network

there for all working i.e battery, electric battery is a device which consisting one or more electro-chemical cells. Although there are some previous efforts for surveying the characteristics, applications, and communication protocols in WSNs[5][6][7][8]. The scope of the survey presented in this paper is distinguished from these surveys in many aspects.

A complete sensor network can be further divided into small areas known as clusters using well known

algorithm is K-means[9]. It has some steps to be followed based on K value where K is number defined by user that how many clusters will be there. It has centroid position which is closed to the each point or sensor in case of sensor network to create the cluster. It is very old technique to form clusters, commonly used in wireless sensor network. There are two types of machine learning algorithm: first one is supervised and unsupervised learning. Supervised works known facts but in case of unsupervised works for unlabeled data[10] shown in figure 2.

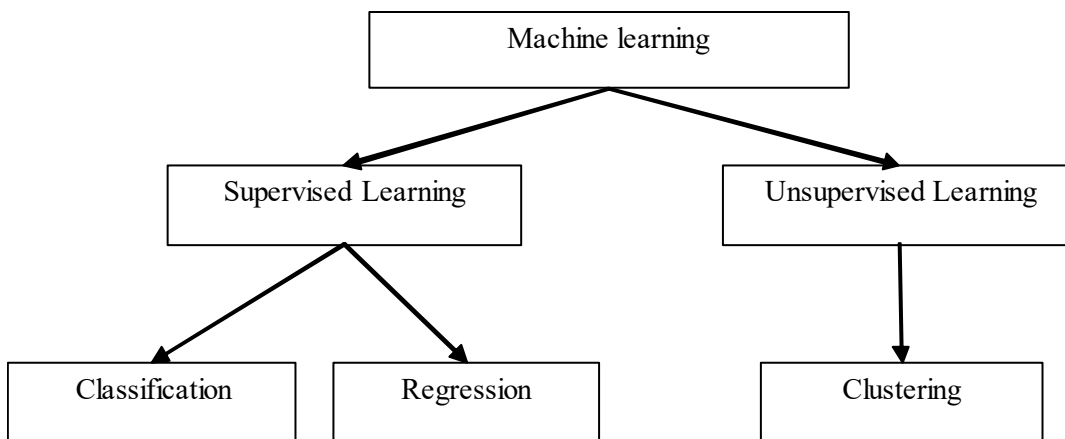


Figure 2: Machine learning algorithms types

2. Previous surveys of WSN Clustering Routing protocols and clustering algorithms

WSN has different types of routing protocols which

play important role to design the network. There have been some survey or review papers on routing protocols that can be cluster based and k-mean clustering shown in Table 1.

Table 1. Summary of previous survey on routing clustering protocols in WSN

Sr. no	Year of survey	Authors	Paper Title
1.	2013	Park, Geon Yong Kim, Heeseong Jeong, Hwi Woon Youn, Hee Yong	A Novel Cluster Head Selection Method based on K-Means Algorithm for Energy Efficient Wireless Sensor Network[11]
2.	2015	Santar Pal Singh, S. C. Sharma	A Survey on Cluster Based Routing Protocols in Wireless Sensor Networks[12]
3.	2016	Amit Sarkar, T. Senthil Murugan	Routing protocols for wireless sensor networks: What the literature says?[13]
4.	2016	Periyasamy, Sasikumar Khara, Sibaram Thangavelu, Shankar	Balanced Cluster Head Selection Based on Modified k-Means in a Distributed Wireless Sensor Network[14]
5.	2016	Solaiman, Basma Fathi Sheta, Alaa	Energy optimization in wireless sensor networks using a hybrid K-means PSO[15]
6.	2016	Ray, Anindita De, Debashis	Energy efficient clustering protocol based on for enhanced network lifetime in wireless sensor network[16]
7.	2016	Reza, Seyed Tabbakh, Kamel	Towards Energy Efficient k-MEANS Based Clustering Scheme for Wireless Sensor Networks[17]
8.	2016	Devi, Gayatri	The K-Means Clustering used in Wireless Sensor Network[18]
9.	2017	Nabil Sabor, Shigenobu Sasaki, Mohammed Abo-Zahhad and Sabah M. Ahmed	A Comprehensive Survey on Hierarchical-Based Routing Protocols for Mobile Wireless Sensor Networks: Review, Taxonomy, and Future Directions[19]
10.	2018	Shanmukhi, M. Patil, Dr. Anitha Amudahavel Sathish, G. Naga	Weighted Compressive Sensing With K-Means Algorithm In Wireless Sensor Networks[20]
11.	2019	Lucia Keleadile Ketshabetswe, Adamu Murtala Zungeru, Mmoloki Mangwala, Joseph M. Chuma, Boyce Sigweni	Communication protocols for wireless sensor networks: A survey and comparison[7]
12.	2019	Rodriguez, Mayra Z Id, Cesar H Comin Casanova, Dalcimar Bruno, Odemir M Amancio, Diego R Costa, Luciano F	Clustering algorithms : A comparative approach[9]

3. WSN Clustering Routing Protocols

An effective role of a routing protocol is to find out the multiple paths for nodes to send the data in whole sensor network while gaining network life time as maximum as possible[7]. The network life time is completely depends on the sensor nodes residual energy. The classification of routing protocols is based on the nodes how they are going to communicate with BS. There are many ways to categorize the routing protocols[21], cluster based shown in figure 3. Many clustering routing protocols have been proposed[22][23][24]. Many survey[8][25][26][27][28] and review papers[13][29][30][31] have been published and show the different parameters values of different types of protocols. The routing protocols are associated based on performance metrics. The performance metrics are effectual energy deployment and data accumulation, extraordinary

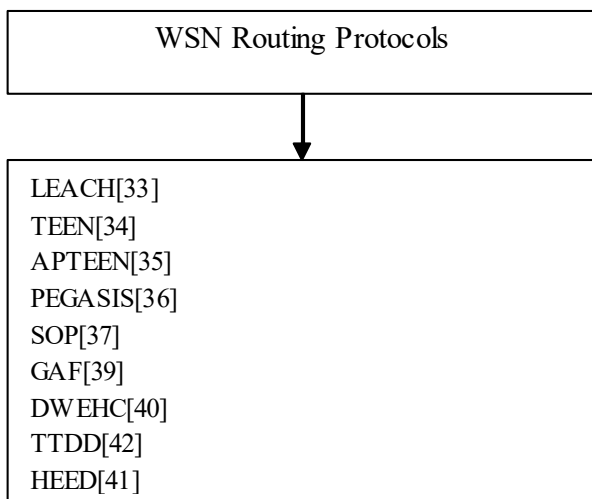


Figure 3: WSN clustering routing protocols[21]

scalability, fewer calculation overhead, good data distribution model, aggregate lifespan of a network, and well organized optimum route with node flexibility[32]. There are many WSN routing protocols listed as LEACH[33], TEEN[34], APTEEN[35], PEGASIS[36], SOP[37], GAF[38], DWEHC[39], TTDD[40], HEED[41] shown in figure 3.

4. Distance based clustering algorithm in WSN

The distance based algorithm[42] work has been developed for an energy efficient clustering approach in wireless sensor network. This approach consumes the less energy and save the energy level of each node. In WSN, cluster head selection process should be like to enhance the energy level of each node and comprise the whole network in consideration. In this algorithm distance between nodes main methodology which chooses the cluster head from all over the network. The main concern to find the cluster head to pay the role for whole cluster to collects the data from cluster member. This algorithm gives the comparison with non-clustering that shows remarkable output with energy usage comparison of PEGASIS protocol. In PEGASIS protocol total energy consumption of network with five nodes is more, where as in distance based it is less shown in figure 4. and the distance coverage is also given the difference which in PEGASIS distance coverage is more where as in distance based CH algorithm is given the distance coverage is less with cover all nodes. So distance based clustering selection algorithm gives more efficient way to use the energy of each node.

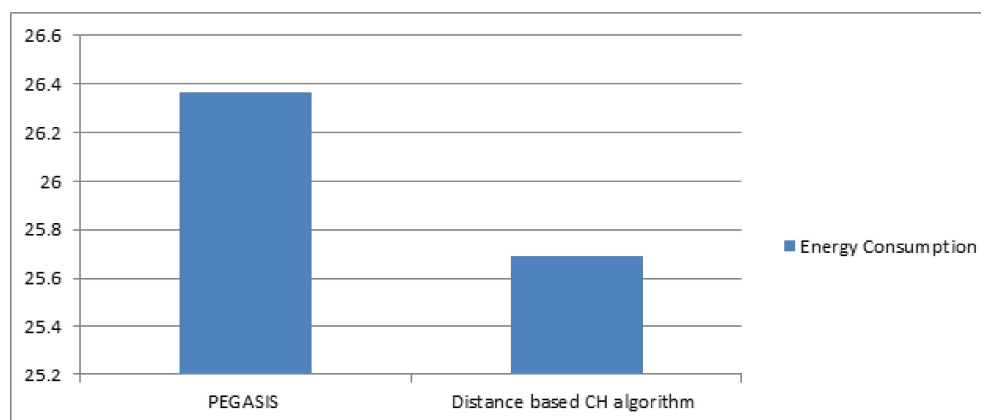


Figure 4: Energy Consumption (J)

CONCLUSION

In clustering, the cluster formation and cluster head decision both are major challenge. As clustering improves the energy efficiency of whole sensor network which is main concern. So need to focus on the cluster head selection approach which gives better performance. Distance based CH algorithm gives the better outcome for sensor network. This algorithm focuses on the distance coverage for the whole network. As concern to energy distance is main factor to consider in formula. Each network is taken as a whole then the energy consumption can be optimized by the rotation of this cluster head. The approach involves the concept which represents the different steps that are performed to conserve the energy of CH in wireless sensor networks. In distance based CH algorithm is used to select cluster head among some of the wireless sensor nodes based on distance between nodes. In this distance based CH algorithm gives comparison graph of energy and distance of each node of sensor network

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A STUDY OF CONSUMER PERCEPTION TOWARDS PATANJALI PRODUCTS IN MUZAFFARNAGAR DISTRICT

Dr. Dinesh Chand and Vivek Kumar Tyagi*

Principal, SMPG Girls College, Meerut

*Research Scholar

ABSTRACT

Consumers now a days look for healthy products along with the quality because, consumer of this era have become more cautious about their health and also show a tendency to maintain a healthy life. As consumers are cautious of chemical preservatives added in the products, they are moving towards herbal and ayurvedic products. The purchase decision of the consumers depends on the quality, price and benefits offered by the brand especially when it comes to brand of eatable, cosmetics and medicines. This paper throws light on the consumer's perception towards the Patanjali products in Muzaffarnagar district. There is a need to know the level of satisfaction for Patanjali products which has had a massive growth in a very short span of time when compared to other ayurvedic products. The major finding in the study says that swadeshi brand and natural product are the two main reasons that influence consumers to buy Patanjali products and it also reveals the consumers satisfaction level towards the Patanjali products.

Keywords: Ayurveda, Natural product, Healthy lifestyle.

INTRODUCTION

Life of human being depends on healthy life. Ayurveda helps to lead a healthy life. Ayurveda means science of life. Indian market is well known for ayurvedic and natural products. Ayurveda is the only surviving and widely accepted form of ancient medicine. Patanjali Ayurved Ltd is one of the herbals and Ayurvedic company with tremendous growth and is one of the fastest growing FMCG firm in India.

Baba Ramdev established the Patanjali Ayurveda Ltd on 13th January 2006 along with Acharya Balakrishna, with the objective of establishing science of Ayurveda in accordance and coordination with the latest technology and ancient wisdom. Company's 92% shares are owned by Acharya Balakrishna and remaining 8% is owned by sarwan and Sunita Podder, a Scotland based non-resident Indian couple. Patanjali offers wide range of ayurvedic products that includes medicines, beauty care, dental, bakery and dairy products etc. Consumer can purchase products through its web-site, www.patanjaliayurved.net, from where

customers can order the products and get free delivery of the same if the order value exceeds INR 499. Patanjali products are offer discount which attracts the consumers. As it is made of raw materials directly purchased from natural plants there is no side effects after using this product. This is the main reason for the consumers to move towards Patanjali products.

RESEARCH OBJECTIVES

- To study the brand perception of Patanjali in the minds of consumers
- To study the satisfaction level of consumers after using Patanjali products
- To know the attributes that a consumer keeps in mind while buying Patanjali products.

RESEARCH METHODOLOGY

Sampling: The sample of 200 consumers selected from Muzaffarnagar district by using simple random sampling method to select the sample. **Tools used for the study:** The study is carried out with the help of both primary and secondary data. Primary data was collected through well-structured

questionnaire provided to the consumers. Secondary data was collected from internet, Journals and articles. For scaling purpose Likert's 5-point scale was used for certain questions. Chi-square has been used to analyze the questionnaire results.

NEED FOR THE STUDY

The consumer is an individual who pays some amount of money for the thing required to consume goods and services. Consumers play a vital role in the market. The satisfied customers are the one who creates value to the company hence this research focuses on the factors influencing consumers to purchase Patanjali products.

HYPOTHESIS

H₀: There is no significant difference between price and usage of the Patanjali products

H₁: There is significant difference between price and usage of the Patanjali products

LITERATURE REVIEW

According to S Anupriya (2017) in her study "A study on consumer's preference and perception towards Patanjali products" analyzed the fact that Ayurvedic products are reasonably cost effective and well accepted by consumers. They are easily available and do not have side effects.

According to Md. Irshad Ali and Manmohan Yadav (2015) in their study "A study of consumer perception of herbal products in Bhopal" They found that as consumers are aware of side effects created by chemical products they are moving towards natural and ayurvedic products.

According to Preeti Pillai and Dr. S. O. Junare (2016) in their study "A study on consumer's perception towards Eco-friendly products in Ahmedabad" analyzed the fact that consumers do not favor ecofriendly products because ecofriendly products are priced high they are not duly promoted, not labeled properly so consumers are unable to distinguish between the conventional one.

FINDINGS OF THE STUDY

Table 1. Age group of the respondents

Age	No. of respondents	Percentage
Below 20	16	8
20-30	163	82
30-40	12	6
40 and above	9	4
Total	200	100

Source: Field survey data

The above table clearly describes, out of 200 respondents 82% respondents are between the age group of 20-30. From this, we can say that Patanjali products are more preferred by the youth.

Table 2. Reasons for purchasing Patanjali products

Reasons	No. of respondents	Percentage
Reasonable price	22	12
Natural product	105	52
Swadeshi brand	59	29
Brand image of Baba Ramdev	8	4
High quality	6	3
Total	200	100

Source: Field survey data

From the above table it can be analyzed that natural product (52%) and Swadeshi brand (29%) are two factors that primarily influence the consumers to buy Patanjali products.

Table 3. Place of purchase

Place	No. of respondents	Percentage
Patanjali shops	128	63
Online shopping	6	3
Super markets	42	22
Departmental stores	24	12
Total	200	100

Source: Field survey data

This table portrays that, 63% of the respondents are purchase the product from Patanjali stores ,3% of the respondents purchase through online shopping,22% of the respondents purchase from Super markets. From this, we can say that offline purchasers are more when compared to online purchasers

Table 4. Source of information about Patanjali

Source of information	No. of respondents	Percentage
Family and Friends	73	36
Internet	16	8
News paper	15	7
Television	96	49
Total	200	100

Source: Field survey data

From the above table it can be analyzed that 49% of consumers gained knowledge about Patanjali from Television. Therefore, we can say that Television is the best source of promotion for Patanjali products

Table 5. Category of patanjali products used

Category	No. of respondents	Percentage
Hair care products	35	17
Beauty care Products	37	18
Dental products	85	43
Dairy and Bakery products	20	10
Medicines	23	12
Total	200	100

Source: Field survey data

After analyzing the above table, the most people are use the Dental products (43%). The least used category is Diary and Bakery products (10%).

TESTING HYPOTHESIS

H₀: There is no significant difference between price and usage of the Patanjali products.

H₁: There is significant difference between price and usage of the Patanjali products.

Table 6. Usage of Patanjali products

Price	Usage of the product			
	Regular	For trial basis	Rarely	Total
Cheap	23	5	7	35
Reasonable	80	20	38	138
Costly	9	13	5	27
Total	112	38	50	200

Table 7. Chi square analysis

Chi square value	Table value	Significance
19.2	9.49	Significance

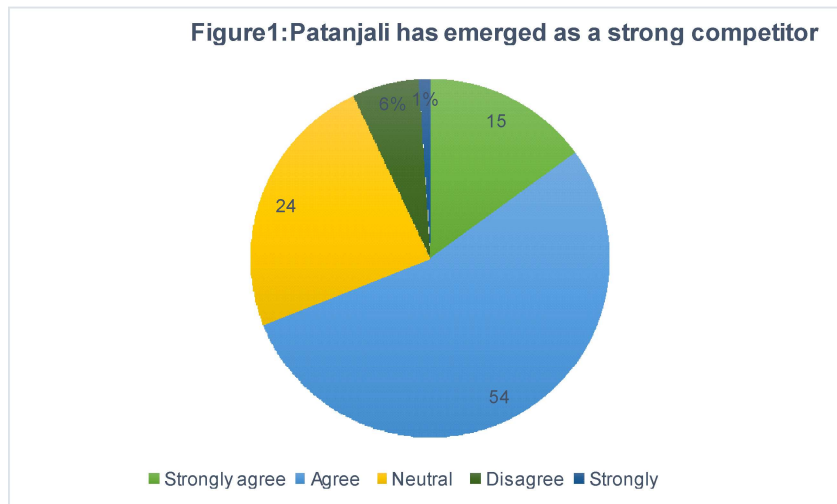
Source: Field survey data

The chi square analysis, shows that the alternative hypothesis, there is significant difference between price and usage of the product has been accepted. The null hypothesis that there no is significant difference between price and usage of the product has been rejected. Thus, researchers conclude that the usage of the Patanjali products based on price.

Table 8. Patanjali has emerged as a strong competitor to other MNCs

Opinion	No. of respondents	Percentage
Strongly Agree	30	15
Agree	111	54
Neutral	46	24
Disagree	12	6
Strongly disagree	1	1
Total	200	100

Source: Field survey data



Source: Field survey data

Table 8 and figure 1 reveals that majority of the respondents 54% agree that Patanjali has emerged as a strong competitor for MNCs. By this we can say that Patanjali has been successful in tapping a large section of the market.

Table 8. Overall satisfaction towards Patanjali products

Opinion	Frequency	Percentage
Very satisfied	48	24
satisfied	131	66
Neutral	14	7
Dissatisfied	7	3
Very dissatisfied	0	0

Source: Field survey data

From the above table it can be analyzed that 90% of the consumers are satisfied about Patanjali product lines.

CONCLUSION

Healthy life is the dream of each and every human being in the world, as consumers are aware of harmful effects created by chemical products, this has made the consumers to shift to herbal and ayurvedic products and with this context the study has been done to identify the consumers perception towards the Patanjali products. The study reveals that Patanjali has given a headache to many marketers with its unconventional ways of marketing. It has disrupted the whole FMCG sector and bought a revolution in the industry in a very

short span of time. The findings in the paper show that there are many significant factors that together make up the purchasing decision of the product. In the above study, a large portion of the users are satisfied with the Patanjali products, it may be due to the ability of products to satisfy customer needs. The satisfaction brings in the retention of customers.

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IMPACT OF FOREIGN INSTITUTIONAL INVESTMENT IN INDIAN SECONDARY MARKET

Mohd. Danish

Research Scholar Government PG College, Deoband Saharanpur

ABSTRACT

India has witnessed over a decade of Foreign Institutional Investment and with each passing year these flows have gained in their significance and have played a key role in the overall Indian Economy.

In the context of the balance of payment crisis of 1991 a comprehensive structured and financial sector reform process was initiated in India which was the starting point for gradual deregulation of financial sector and development and integration of various segments of financial markets. As a result, the Indian stock market became a buoyant stock market.

Coming to the year financial year 20017-2018 we can see that the BSE Sensex attained the life time high but again plummeted to 14000 in the matter of 3 months. During that time the international markets were suffering from the subprime crisis. The study tries to find out did the subprime crisis led the Foreign Institutional investors to pull out their money from the Indian secondary market and if yes then what was the impact of the crisis.

Keywords:

Secondary Market-

1) A market in which an investor purchases an asset from another investor rather than an issuing corporation.

-Financial dictionary

2) Secondary Market refers to a market where securities are traded after being initially offered to the public in the primary market and/or listed on the Stock Exchange. Majority of the trading is done in the secondary market. Secondary market comprises of equity markets and the debt markets. For the general investor, the secondary market provides an efficient platform for trading of his securities. For the management of the company, Secondary equity markets serve as a monitoring and control conduit-by facilitating value-enhancing control activities, enabling implementation of incentive-based management contracts, and aggregating information (via price discovery) that guides management decisions.

- **Securities Exchange Board of India (SEBI)**

Foreign Institutional Investment

One who proposes to invest their proprietary funds

or on behalf of "broad based" funds or of foreign corporate and individuals and belong to any of the under given categories can be registered for FII.

- Mutual Funds
- Bank
- Investment Trust
- Insurance or reinsurance companies
- Pension Funds
- Endowment Funds
- University Funds
- Foundations or Charitable Trusts or Charitable Societies who propose to invest on their own behalf, and
- Asset Management Companies
- Nominee Companies
- Investment Trust
- Institutional Portfolio Managers
- Trustees Power of Attorney Holders

Regulator of Foreign Institutional Investment

The regulator or in other words the watchdog which keeps a close check on the Foreign Institutional Investment is Securities Exchange Board of India. The FII's have to get them registered with SEBI

before investing in India. The SEBI keeps a close watch on how much and for what purpose FII is coming in India. With time SEBI has become active and keeps a close watch on the Foreign Investment.

UNDERSTANDING OF SUBPRIME CRISIS

To understand subprime lending, first we have to know what the meaning of Subprime is.

Subprime: A term which means that the borrowers have less-than-perfect credit history or

1. Not of top quality
2. Below a prime rate

Subprime Credit

The Credit which is given which has higher risk characteristics, such as bankruptcy or collection accounts.

Subprime lending or B-paper as it is known as is lending at higher rate of interest than the normal rate. Under Subprime lending a variety of credit instruments which includes subprime mortgages, subprime car loans, and subprime credit cards. This lending is done to people depending on the following factors--

- a) Income Level
- b) Size Of Down Payment Made
- c) Employment Status
- d) Credit Score-The people who have compromised credit histories or in other words don't score well on the credit scores which range from 300 to 850. The people who score below 620 credit points qualify for subprime loans.

Subprime Lenders

To access this increasing market, lenders often take on risks associated with lending to people with allegedly poor credit ratings. Subprime loans carry a far greater risk for the lender due to the aforementioned credit risk characteristics of the typical subprime borrower. Subprime Lenders use various methods to offset these risks like in the case of many subprime loans the risk is offset with a higher interest rate and in respect to subprime credit cards, a subprime customer is charged higher late fees, higher over limit fees, yearly fees, or up-front fees for the card.

Borrower Profiles

Subprime can offer an opportunity for borrowers with an allegedly less than ideal credit record to gain access to credit. Borrowers may use this credit to purchase homes, or in the case of cash out refinance, finance other forms of spending such as purchasing a car, paying for living expenses, remodeling a home, or even paying down on a high interest credit card but due to the risk which is involved in the profile of the subprime borrower, this access to credit comes at the price of higher interest rates, increased fees and other increased costs. Some of these costs are often hidden to the borrower. Generally, the credit profile which qualifies a borrower for a subprime loan may include one or more of the following:

- Two or more loan payments paid past 30 days due in the last 12 months, or one or more loan payments paid past 90 days due the last 36 months.
- Repossession, foreclosure, judgment or non-payment of a loan in the past.
- Has filed for bankruptcy in the last 7 years.
- Has a high default probability.

The subprime crisis around the world occurred due to the US sub prime mortgage crisis. The crisis has been explained as under-

Mortgage

In simple terms, it is a "conditional" conveyance of property as security for the repayment of a loan.

Sub-prime Mortgage

It means offering or giving loans to people who do not qualify for them at market interest rates due to their deficient or poor credit history. Since this kind of lending involves risk of non-payment by the client, it is usually offered at a higher interest rate.

ORDER OF HOW THE SUBPRIME CRISIS CAME TO BE?

1) Sowing Seeds for a Disaster-

The US real estate industry had a boom between 2001 and 2005 as property prices reached historic highs on account of low interest rates and price-to-rent ratio.

So we can conclude that the Subprime loans increased over the years and the loans were given to people who did not qualify for these loans. The above graph clearly shows that in the period of 12 years the people taking more Subprime loans as it increased from 5 Billion \$ to be 650 Billion \$. We can also note that the subprime loans which only constituted only 2 to 3% of the total mortgage market in 1994 increased to 26% to 27% of the total mortgage market.

This clearly shows that these loans were given to people who did not even qualify for subprime loans and these loans were given in a hap hazard manner without checking if that person even qualified for such loan or not.

2) Repackaged and Sold-

Sub-prime debts were repackaged by banks and trading houses into attractive-looking investment vehicles and securities that were snapped up by banks, traders and hedge funds on the US, European and Asian markets.

3) Heading for a Catastrophe-

When property prices began to fall due to saturation or lack of demand, the owners had to face mortgage loan which was higher compared to property value. The collapse of the US market had a direct impact on mortgage industry, housing values, hedge funds and real estate companies etc.

As we can see from the above graph that the people who were not able to pay back there Subprime mortgage loans there properties were taken into custody by the Subprime Lenders so as to recover there money. As we can see that as the year 2017 passes the default of repayment of loans has occurred which prompted the Subprime lenders to take the properties into custody.

The full impact of the subprime mortgage crisis is only evident at the end of first quarter of the year 2018. We can see that during the 5 quarters the properties which were foreclosed total up to 21, 97,780 which means that this is the number of

people who defaulted in repayment.

4) Paranoia Sets In-

The people, banks, financial institutes who had bought into the market suddenly found their investments near-valueless - or impossible to accurately value. As they were unable to accurately assess the value of an asset which lead to uncertainty, which is never healthy in an investment climate. Due to the uncertainty paranoia set in the markets, banks reined in their lending to each other and to business, leading to rising interest rates and difficulty in maintaining credit lines.

5) World Wide Repercussions-

As a result the Foreign Institutional Investors who were facing a crunch in there business at home pulled out the money from the Indian stock market which let to the crashing of the Indian Sensex.

REVIEW OF LITERATURE

Mortgage Markets in Crisis: Risk-Based Competition and Lessons JÚLIA KIRÁLY-MÁRTON NAGY; in the summer of 2007, a global financial crisis has emerged which still has not come to an end. The outbreak of the turmoil was the upsurge in the default rate on sub-prime mortgages. Since that time, the signs of the mortgage-market crisis have shown up in other European countries. One of the common causes of the crisis was the predatory lending, the loosening of credit standards as risk-based competition intensified. Its several elements can be observed on the domestic mortgage market as well. Fortunately, this crisis has evaded us now, but it is the time to learn the lesson.

Some Thoughts about Phenomena's Of Subprime, ERIKA MARSI; the aim of this paper is to draw attention to some phenomena, one or two correspondences in connection with the subprime crisis. In this article, I study some causes which led to the subprime crisis, among the others; like the growing extent to which households are indebted, the absence of essential credit risk monitoring which takes place by the process of securitization, the lack

of transparency, and the anomaly of calculating market risk rather than credit risk by the capital requirements of the securitized subprime mortgages. I also reach some points of Basel II approach. Finally, I analyze some questions of moral hazard, which takes place by the bailout of companies became bankrupt, comparing the efficiency of the American and the European approach.

The Subprime Crisis and the Supervision Of The Financial Institutions, MIHÁLY ERDŐS-KATALIN MÉRŐ; If we want to summarize the supervisory conclusions of the current financial crises, we are not in a pleasant situation since we do not know its end, and full scope, yet. However, this crisis has raised already several questions, and issues to be discussed which have not the relevant ones for the financial regulators and supervisors been before. In our paper we analyze the impacts and lessons on the whole financial sector; on the banking, insurance, capital market and the pension sector. The cornerstone of this turbulence is a financial invention, the originate-to-distribute model, which risks were not assessed and mitigated by the financial regulators, supervisors, and rating firms. Moreover they underestimated it. We have identified as the most important issues: the impact of the change of the banking model on the supervisory approach, the supervision of the liquidity, the appropriateness of the credit risk management, the role of the intermediaries (agents, brokers), and the incentive systems of the business model. While we were preparing this article, we had to remember an important lesson: under the time period of crises you may expect new challenges every day.

What To Do? - How To Way Out From Subprime Crisis, MÁRIA MÓRA; A number of prestigious international and European, professional and political organizations are looking for actions and changes to be taken in financial systems in order to avoid or mitigate crisis similar to the subprime crises. Current article summarizes possible solutions selecting from subjective point of view without any demand of completeness. The article shows the principles to be considered in regulatory actions and

it points out the fields which are the most important. The article deals with the following proposals in details: enhancement of transparency, evaluation standards, the role of rating agencies, prudent regulations, liquidity management, Basel II (CRD rules).

Objective of study

To study the impact of the foreign investment which was pulled out from the secondary market by the Foreign Institutional Investment because of the subprime crisis in the American economy?

Research Methodology

The formula of Karl Pearson Correlation has been used. The figures have been taken from secondary sources which is the internet.

$$\rho_{X,Y} = \frac{E(XY) - E(X)E(Y)}{\sqrt{E(X^2) - E^2(X)} \sqrt{E(Y^2) - E^2(Y)}}$$

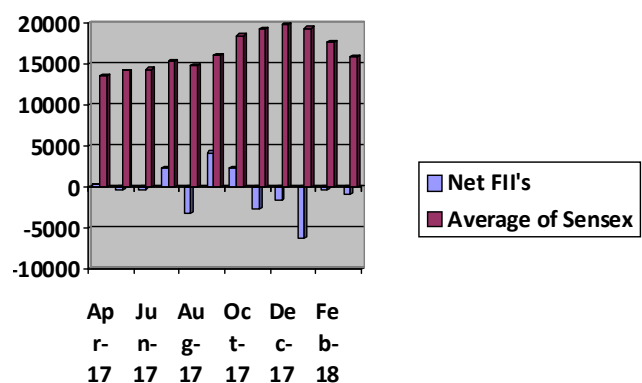
X- Independent variable (Foreign Institutional Investment)

Y-Dependent variable (BSE Sensex)

Data Analysis

Year 20017-2018

Comparison of Sensex with Net FII's



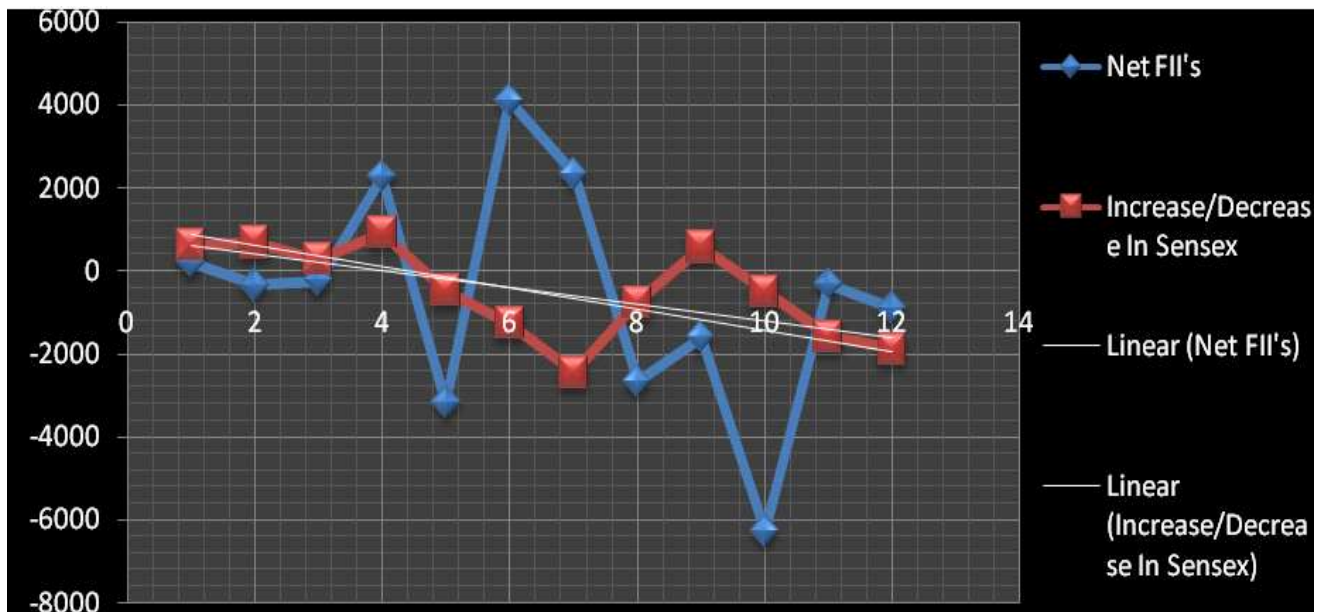
This was the year in which saw the Sensex rise to 20873.33 (Lifetime High attained in February) and then saw it crash to 14809.49 (in the month of March). This year was very volatile and unpredictable markets as were hit by the Subprime crisis.

As we can see that out of 12 months there had been 8 months where there was negative inflow of FII's

but in spite of that the Sensex was able to attain its lifetime high. As we can see from the above graph that the Sensex is rising from April till July and the Sensex is not responding to the negative FII's in the month of May and June. July the Sensex rises again led by the high inflow of FII's and again falls in August due to the negative FII's. In September

and October we see again that the Sensex rises with the positive inflow of FII's but thereafter there has been a negative inflow of FII's from November to March but the Sensex rises in November, December and January. The Sensex finally responds to the negative FII's in the month of February and March in which the Sensex falls.

Scatter Diagram of Sensex with the Net FII's



The above diagram shows the relation between the Net FII's and the Increase/Decrease In Sensex. We can note here that linear line Of Net FII's and the Increase/Decrease in Sensex is also decreasing as the year passes by.

The Correlation comes out to be -0.12412 which means it lies in the range of 0 to -0.25 therefore there is Low Degree of Negative Correlation. Thus it means there negative relation between the both

CONCLUSION

The foreign institutional investment over the years had become to be an important part of the Indian economy. There huge inflows of cash do make a difference in the Indian markets but as we can see from the data analysis we can conclude that the foreign institutional investment did pull out a lot of money from the secondary market due to the subprime crisis in the American economy but we cannot make a correlation between the Sensex and

the Foreign institutional investment during the financial year of 2017-18.

The foreign institutional investors pulled out there money from the secondary market from November 2017 to March 2018 which meant they had to cover there losses which they had incurred due to the Subprime crisis. The downfall in Sensex was more due the uncertainty which was caused by the Subprime crisis as no one was able to estimate there loses. The money by the foreign institutional investors acted as a catalyst which in turn prompted the Indian investors to take out there money from the secondary market.

Annexures Year 2017-2018

April 2017 to September 2018

YEAR 2017-2018	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17
Highest Point Of Sensex	14228.58	14544.46	14650.51	15794.92	15318.6	17291.1
Lowest Point Of Sensex	12455.37	13765.46	14003.03	14664.26	13989.11	15422.05
Average Of Sensex	13477.79	14156.47	14334.3	15253.42	14779.05	16046.02
Closing	13872.37	14544.46	14650.51	15550.99	15318.6	17291.1

FII (Rs In Crore)

Registered FII's	1020	1042	1051	1066	1077	1100
FII Purchase	12222	12792	13861	18773	16044	17810
FII Sale	12005	13132	14093	16485	19216	13692
Net FII's	217	-340	-232	2288	-3172	4118

October 2017 to March 2018

YEAR 2017-2018	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18
Highest Point Of Sensex	19977.67	19976.23	20375.87	20873.33	18663.16	16677.88
Lowest Point Of Sensex	17328.62	18526.32	19079.64	16729.94	16608.01	14809.49
Average Of Sensex	18500.31	19259.55	19827.28	19325.65	17727.54	15838.38
Closing	19837.99	19363.19	20286.99	17648.71	17578.72	15644.44

FII (Rs In Crore)

Registered FII's	1124	1173	1214	1279	1303	1319
FII Purchase	30556	16623	14385	17927	15106	16368
FII Sale	28209	19286	15974	24196	15414	17266
Net FII's	2347	-2663	-1589	-6269	-308	-898

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ANALYSIS OF THE IMPACT OF GOODS & SERVICES TAX ON INDIAN ECONOMY

Dr. Saurabh Mittal & Dr Ashfaq Ali

Associate Professor, Shri Ram Group of Colleges, Muzaffarnagar

ABSTRACT

In order to bring the advantages to the nation, the government of India is planning to implement goods and service tax. under GST regime, the VAT at the state level and CEN-VAT at the central level is integrated into one common law . GST is a comprehensive indirect tax for the entire nation, which will make India 'One unified common market'. It is a single taxation system that will reduce the number of Indirect taxes. The prices of production and services would reduce, thus this system would prove to be beneficial for the people who are fed-up of paying high prices. The effect of GST on the manufacturing sector has been mostly positive .it has helped in reducing the cost of production and simplified the entire tax system.GST is expected to boost competitiveness and performance in India's manufacturing sector. GST is India's biggest tax reform founded on notion of "One Nation, One Market, One Tax. GST dismantled all inter-state barriers with respect to trade. The rollout has renewed the hope of India's fiscal reform program regaining momentum and widening the economy.GST mechanism is designed in such a way to generate revenue for both central and state government.

Keywords : GST, VAT, CEN-VAT, CGST, SGST

INTRODUCTION

Taxation is a mechanism to generate revenue by the Government to finance various developmental activities in the country. Prior to the introduction of Goods and Service tax (GST), various taxes are levied by the Central Government body and the State Governments

Some minor taxes are also levied by the local authorities such as Municipality or Local Council. There are various levy tax is derived from the Constitution of India which allocates the power to levy various taxes between Centre and State. Some of the important Central taxes, e.g. CENVAT, Customs Duty, Service Tax etc. Some of the important State level taxes, e.g. State Sales Tax, CST, Works Contract Act, Entry tax, other local levies etc.

The idea of a goods and service tax (GST) for India was first mooted sixteen year back, during the Prime Ministership of Shri Atal Bihari Vajpayee.

Thereafter, on 28th February 2006, the then Finance minister Mr. P. Chidambaram in his budget 2006-07 proposed GST as a single centralized indirect tax. The bill was introduced on December 19, 2014 and passed on May 6, 2015 in the Lok Sabha and passed in Rajya Sabha on 3 August, 2016. The government wants to implement GST Bill from 1 April 2017. After the enactment of various GST Laws, GST was launched with effect from 1 July 2017 by Shri Narendra Modi, Hon'ble Prime Minister of India in the presence of Shri Pranab Mukherjee, the then President of India in mid-night function at the Central Hall of Parliament of India.

Clause 366(12A) of the Constitution Bill defines GST as "goods and services tax" means any tax on supply of goods, or services or both except taxes on the supply of the alcoholic liquor for human consumption. So GST is a comprehensive tax levy on manufacture, sale and consumption of goods and services at a national level.

Under GST regime, the VAT at the state level and

CEN-VAT at central level is integrated in to common Law. GST is not simply State-VAT plus CEN-VAT (including Service Tax) but an improvement over the previous system of VAT and disjoined Service Tax. Under the GST scheme, no distinction is made between goods and services for levying of tax. This means that goods and services attract the same rate of tax. GST is a multi-tier tax where ultimate burden of

tax fall on the consumer of goods/services. Under the GST scheme, a person who was liable to pay tax on output, whether for provision of service or sale of goods, is entitled to get input tax credit (ITC) on the tax paid on its inputs.

Concept Overview-GST at a Glance

In order to bring the advantages to the nation, the Government of India is planning to implement the GST. This system is called Dual GST which is divided into 'Central Goods and Service Tax and State Goods and Service tax'. Apart from the current two elements another element has been summed i.e. Integrated Goods and Service Tax (IGST) is include the Central Goods and Services Tax and State Goods and Services Tax imposed on all inter-state business transactions with suitable requirements for stock transfer products as well as services.

Central taxes to be subsumed:

- A. central excise duty
- B. Additional excise duty
- C. The excise duty levied under the medicinal and Toiletries preparation
- D. service tax
- E. Additional custom duty commonly known as countervailing duty (CD)
- F. Special additional duty of custom-4% (SAD)
- G. Cesses and surcharges in so far as they relate to supply of goods and services.

State taxes to be subsumed:

- A. Vat/sale tax
- B. Central sale tax (levied by the center and collected by the respective state)

- C. Entertainment tax
- D. Octroi and entry tax
- E. Purchase tax
- F. Luxury tax
- G. Taxes on lottery, betting and gambling.
- H. State cesses and surcharges in so far as they relate to supply of goods& services.

Dual System GST

Many Countries in the world have a single unified GST system i.e., single tax applicable throughout the country.

The Dual System of GST has two components known as:

- Central Goods and Services Tax (CGST) and
- State Goods and Services Tax (SGST).

The current taxes like excise duties, service tax, custom duty etc. will be merged under CGST. The taxes like sales tax, entertainment tax, VAT and other state taxes will be included in SGST. GST will be levied on:

- Intra-state supply and consumption of goods and services;
- Inter-state movement of goods;
- Import of Goods & Services.

Benefits of Dual GST

The Dual GST is expected to result in-

1. Reduction in the number of taxes at the Central and State Level.
2. Decrease in effective tax rate for many goods
3. Removal of current cascading effect of tax.
4. Reduction of transaction cost of the tax payer through simplified tax compliance.
5. Increased tax collection due to wider tax base.

Importance of Goods and Service Tax

1. GST is a comprehensive indirect tax for the entire nation, which will make India "one unified common market". Previously the Goods and services were imposed and administered differently.

2. It will replace multiple taxes like VAT, CST, Excise Duty, Entry Tax, Octroi, LBT, Luxury Tax etc.
3. There are four types of GST namely:
 - a. SGST - State GST, collected by the State Govt.
 - b. CGST - Central GST, collected by the Central Govt.
 - c. IGST - Integrated GST, collected by the Central Govt.
 - d. UTGST - Union Territory GST, collected by the Union Territory
4. Tax Payers with an aggregate turnover in a financial year up would be exempted from tax.
5. Four-tier tax structure of 5%, 12%, 18% and 28%
6. GST is a destination based consumption tax made on value addition.
7. The Centre and States will share GST tax revenue at 50:50 ratio (except IGST)

Existing and proposed Tax Structure of Indirect taxes:

Existing structure of Indirect taxes

Details	Goods	Services
Excise Duty	12.50% / 6% / 2%	-----
Value Added Tax	12.50% / 13.50% / 14% / 5%	-----
Central Sales Tax	2%	-----
Local Tax	0.10% to 8%	-----
Service Tax	-----	15%

Source: GST Council Report, 4th Edition 2016

Proposed structure of Indirect taxes:

GST Council has announced five Tier tax structures which include 0%, 5%, 12%, 18%, 28%. The below table is showing the distribution in detail.

Particulars	Rates	References
Nil Rate	0%	Food Grains
Lower/ Concessional Rate	5%	Mass Consumption Products
Standard Rate-1	12%	Most Products
Standard Rate-2	18%	Most Products
Special Rate/ Luxury Goods	28% + Cess	Luxury Items
Other Rates: Compounding Rate TDS/ TCS	1% / 2.50% / 1%	Section (9) Section 46/56

Source: GST Council Report, 4th Edition 2016

Products not covered under GST:

The Goods and Service Tax does not include certain products they are as follows.

- Petroleum Products
- Alcohol
- Tobacco Products

Need for GST model in India:

As per the reports of Task Force on Goods and Services tax (2009), the Indian taxation system led to misallocation of resources and lower productivity in terms of economic growth, international trade and

overall development of the Indian economy. Therefore, there was an emergent need to replace the existing tax system with a new engine of taxation of Goods and Services.

Following are the supporting reasons to adopt GST

1. In existing system, there is huge number of taxes that has to pay by consumers; with GST it will be single tax to pay.
2. Many areas of Services which are untaxed. After the introduction of GST they will also get covered.

3. GST may help to avoid confusions caused by present complex tax structure and will help in development of a common national market.
4. Excise, VAT, CST have the cascading effects of taxes. Therefore, there will be end up in paying tax on tax.
5. GST will lead to credit availability on throughway purchases.
6. Applying of GST will do more than simply redistribute the tax burden from one sector or Group in the economy to another.
7. Achieves, uniformity of taxes across the territory, regardless of place of manufacture or distribution.
8. Provides, greater certainty and transparency of taxes.
9. Ensures tax compliance across the country
10. GST will avoid double taxation to some extent.
11. The effective implementation of GST makes sure that India provides a tax system that is almost similar to the rest of world where GST implemented.
12. GST will also improve the International level cost competition of various native Goods and Services.
13. GST will provide impartial tax structure that is neutral to business processes and geographical locations within India.
14. If the GST is implemented in the true spirit, it will have many positives effects for the stakeholders and will lead to a better friendly tax environment.
15. If Indian market will be competitive in market in pricing, then more and more foreign players will try to enter the market, which results in more number of exporters and benefits of Indian market.

Contribution of GST towards Economic Development:

An economy has to function in the ecosystem. We cannot separate the economy from an ecosystem as the ecosystem provides factors of production such as land, labour, capital etc with which economy has to function. Sustainable economic growth is managing the resources in such a way that present

human needs are fulfilled and resources are so efficiently utilized that they don't get deleted and remain available for future generations. The introduction of GST in India is expected to provide much needed stimulant growth to the economy as it has transformed the base of indirect tax structure towards free flow of Goods and services. It is expected to remove the cascading effect of taxes. Further the benefit of GST to the economy can be removal of myriad of taxes and less compliance and simplified tax policy as compared to earlier one. It will also lead to fall in manufacturing cost of goods and services which will reduce the burden from consumer's head, lower the burden less a person has to spend money to buy the product. Due to lower price of product the demand may increase leading to increased production indirectly to meet the demand. Hence production of goods is also expected to increase. GST is an attempt to normalize the taxes applied on various goods and services. This will cut off the cascading effect of the taxes and in turn bring out a better place for the customers and suppliers. With GST brought into place a uniform price shall be maintained throughout the country and most of the food items are exempted under GST such as bread, buttermilk, milk, fresh fruits and vegetables etc. thus ensuring the contribution towards zero hunger and moreover implementation of GST has led to decline in prices of cotton textiles, wool, silk and synthetic fibres. Further on account of increase in economic activity resulting in higher growth, new employment opportunities will increase which will directly benefit the urban poor. Moreover, health sector and education sector services are exempted from getting taxed under GST regime. These services contribute to basic human needs the exemption for these services will enable the poor to have cheaper accessibility. Thus GST may have direct impact on accomplishing sustainable development goals. Thus by reducing price of goods consumed and exempting basic goods of daily consumption the GST regime ensures to contribute towards economic growth of the country.

Objectives of the Study:

The main objectives of the study are

- To study the importance of One Nation One Tax
- To assess the impact of GST on various sectors

Research Problem:

The concept of Goods and Service Tax (GST) is one of the biggest revolutions in decades around the world. But it seems that India is taking very slow steps to meet target. This research intends to focus on understanding concept of goods and service tax and its impact on Indian economy.

Methodology:

The study focuses on wide study of secondary data collected from various books, National & international Journals, published government reports, publications from various websites which focused on various aspects and important of Goods and Service tax.

Literature Review:

- Lourdunathan & Xavier (2017) conducted a study based on exploratory research technique on the basis of past literature to study the opinions of manufacturers, traders, society etc. about the GST and the challenges and prospects of introducing GST in India. They concluded that no doubt GST stands with one tax one nation slogan and will provide relief to producers as well as consumers. Its efficient implementation will lead to resource and revenue gains. They also said that seamless credit and return processing without human intervention requires to educate, train, and conduct workshops on GST on the part of government.
- Sachin Abda (2017) highlighted that GST would be a major move towards Indian economy as since independence India has faced some of the issues because of complex indirect tax system, this complexity is assumed to be resolved by GST structure replacing all state

and central government taxes into one unique tax.

- Upendra Gupta (2017) highlighted upon the key features and Benefits of GST in a comprehensive manner. He emphasized on how will GST benefit and empower citizen and who is liable to pay GST.
- Dr. Badar Alam Iqbal (2017) states the very purpose of GST is to take a shift from existing complex, multi layers and cascading indirect tax mechanism which permits tax set off across the value chain in terms of both commodities and services. By implementing GST, cost of output will go down resulting into enhancing the degree of competitiveness of Indian goods in the context of imports and further increase the margin of profit.
- B, MitraPriya, 27 (2017) stated GST as a Game changer in Indian Economy. The paper showed that GST reduced complexity of various taxes and also removed cascading effect. Tax structure shown in paper in which various tax rates included. Impact on Tax incidence included various sectors such as Telecom, E- Commerce, Automobile, real estate, banking and consumer goods. Impact on input tax credit showed that there would be availability of cross credit utilization in CGST and SGST.
- Nishitha Guptha, (2017) in her study stated that implementation of GST in the Indian framework will lead to commercial benefits which were untouched by the VAT system and would essentially lead to economic development.
- Mujalde, S. and Vani, A.,21 (2017), in their research paper on 'Goods and Services Tax (GST) and its outcomes in India' focused on the features of GST, impact of GST on Indian economy and discussed possible advantages and challenges of GST.
- Nath, B., 22 (2017), in his paper on 'Goods and

Services Tax: A Mile Stone in Indian Economy' discussed benefit and impact of GST on Indian economy and also conclude that GST has a positive impact on various sectors and industries.

- Jaspreet Kaur (2016) has thrown light on GST, its features and also effect of GST on prices of goods and Services. According to him electronic goods, restaurant bill, SUV'S and diamond, jewellery, textile are going to be cheaper and costlier respectively. He also highlighted that implementation of GST is expected to narrow the large indirect tax differences between organized and unorganized sector.
 - Raj Kumar (2016) analyzed and compared the proposed GST framework and current taxation system, described its effect on employment and various sectors
 - Khurana & Sharma (2016), conducted a study with a view to explore various benefits and opportunities of GST by throwing a light on its' background, objectives of proposed GST plan and its impact on Indian tax scenario. They concluded that GST implementation will definitely benefit producers and consumers although its' implementation requires concentrated efforts of all stake holders especially central and state government.
 - Munde & chavan (2016) conducted a study to discuss the pros and cons of GST and accordingly make suggestions to minimize loopholes and make it more effective. They concluded that if the probable loopholes are dealt effectively, tax payers will accept the change brought upon and if procedures in GST proves to be simple and assures the involvement of interest of all stakeholders then definitely it will lead to economic development and rationalization of prices.
 - Dr. Ambrish states in his study "Goods and Service Tax and Its Impact on startups "that
- GST is expected to unite the country economically as it will remove various forms of taxes that are currently levied at different points. Based on a 2015 NASSCOM report this paper also analyzed how the GST has impact on startup of the country and how the has the impact on GDP.
- Sherawat & Dhanda (2015) conducted a study focused on advantages and challenges of GST faced by India in execution. They concluded that a simplified and transparent tax system was the need of Indian economy. Pointing out the various advantages they said that GST will provide India a world class tax structure and a seamless tax system but it will depend upon effectiveness of its implementation.
 - Nishita Gupta in her study "Goods and service tax: it's impact on Indian Economy" stated that the goods and services Tax (GST) will indeed be a significant improvement towards a comprehensive indirect tax reforms in India and it would give India a world class tax system and improve tax collections. It would end distortions of differential sectors .Further viewed that it would lead to the abolition of taxes such as central sales tax, state level sales tax, octroi, entry tax, stamp duty, telecom license fees, tax on consumption. GST is expected to create a business friendly environment in India, as a result price levels and inflation rates would come down overtime because of application of uniform tax rate. More over it will also improve government's fiscal health as the tax collection system would become more transparent, making tax evasion difficult.
 - Nitin Kumar wrote in his research paper "Goods and Services tax in India: A way forward that The Goods and Service Tax (GST) is one of the biggest taxation reforms in India The central idea behind this form of taxation is to replace existing levies like VAT, , service tax ,excise duty and sales tax by levying a comprehensive tax on the manufacture and consumption of

goods and services in the country. GST is expected to unite the country economically as it will remove various forms of taxes that are currently levied at different points.

- Dr. R. Vasanthagopal, Studied "GST in India: A Big Leap in the Indirect Taxation System", and found that the positive impacts are dependent if design of the GST is rational and if balance the conflicting interests of various stakeholders. Further he said GST would be a big leaf ion the indirect tax system and also give a new impetus to India's economic change. Further he mentioned that the implementation of the GST would be pegged as one of the biggest games changing reforms of the Indian government, which will help India to become an economically integrated economy and help to reduce business costs and facilitate seamless movements of goods and services eliminating local charges.

Impact of GST in India

Positive Impact of GST in India:

1. GST is a single taxation system that will reduce the number of indirect taxes. From now, a single taxation term would cover all of those indirect taxes.
2. The prices of products and services would reduce; thus this system would prove to be beneficial for the people who are fed up of paying high prices.
3. This would reduce the burden from the state and the central government. With the introduction of GST, all indirect taxes would come under a single roof.
4. GST would not be charged at every point of sale like other indirect taxes so in this way, market would be developed.
5. Corruption-free taxation system. GST would introduce corruption-free taxation system.
6. Less tax compliance.
7. Removes cascading effect of taxes.
8. Manufacturing costs will be reduced, hence

prices of consumer goods likely to come down.

9. Due to reduced costs some products like cars, FMCG etc. will become cheaper.
10. A unified tax regime will lead to less corruption which will indirectly affect the common man.

Negative Impact of GST in India:

1. The introduction of GST in the country will impact real estate market. This would increase new home buying price by 8% and reduce buyers' market by 12%.
2. GST is a mystifying term where double tax is charged in the name of a single tax.
3. Most of the dealers don't pay central excise tax and cheat the government by simply giving the VAT. But all of those dealers would now be forced to pay GST.
4. The short-term impact of GST is expected to be neutral-to negative for the broader economy.
5. Production processes are likely to take some time to align with the new framework as firms adjust to the input tax credit system and better manage working capital requirements.
6. For consumers, it will be a mixed bag as some goods become cheaper while others will be expensive.
7. Services will become expensive e.g. Telecom, banking, airline etc.
8. Being a new tax, it will take some time for the people to understand its implications.
9. It is easier said than done. There are always some complications attached. It is a consumption based tax, so in case of services the place where service is provided needs to be determined.
10. If actual benefit is not passed to consumer and seller increases his profit margin, the prices of goods can also see a rising trend.

However, GST is a long term strategy and the positive impact shall be seen in the long run only. Let us hope GST proves to be a game changer in a

positive way and proves to be beneficial to the common man.

GST Analysis and Opinion

GST is purported to bring in the 'one nation one tax' system, but its effect on various industries will be slightly different. The first level of differentiation will come in depending on whether the industry deals with manufacturing, distributing and retailing or is providing a service.

Impact of GST on Manufacturers, Distributor and Retailers

GST is expected to boost competitiveness and performance in India's manufacturing sector. Declining exports and high infrastructure spending are just some of the concerns of this sector. Multiple indirect taxes have also increased the administrative costs for manufacturers and distributors and it is being hoped that with GST in place, the compliance burden will ease and this sector will grow more strongly.

Impact of GST on Service Providers

The effect of GST on the manufacturing sector has been mostly positive. It has helped in reducing the cost of production and simplified the entire tax system. Under the previous tax regime, manufacturers were required to pay around 25%-26% more due to the cascading tax effect.

As per the report of March 2014, there were 12, 76,861 service tax assesses in the country out of which only the top 50 paid more than 50% of the tax collected nationwide. Most of the tax burden is borne by domains such as IT services, telecommunication services, Insurance industry,

business support services, Banking and Financial services etc. These pan-India businesses already work in a unified market, and while they will see compliance burden becoming lesser there will apparently not be much change in the way they function even after GST implementation.

Sector-wise Impact Analysis Logistics

In a vast country like India, the logistics sector forms

the backbone of the economy. We can fairly assume that a well-organized and mature logistics industry has the potential to leapfrog the "Make in India" initiative of the Government of India to its desired position.

E-com

The e-com sector in India has been growing by leaps and bounds. In many ways, GST will help the e-com sector's continued growth but the long-term effects will be particularly interesting because the model GST law specifically proposes a tax collection at source (TCS) mechanism, which e-com companies are not too happy with. The current rate of TCS is at 1% and it'll remain to be seen if it dilutes the rapid boom in this sector in any way in the future. Recently a new section is included; section 194-O defines the applicability of TDS on E-Commerce transactions.

Pharma

On the whole, GST is expected to benefit the pharma and healthcare industries. It will create a level playing field for generic drug makers, boost medical tourism and simplify the tax structure. If there is any concern whatsoever, then it relates to the pricing structure (as per latest news). The pharma sector is hoping for a tax respite as it will make affordable healthcare easier to access by all.

Telecommunications

In the telecom sector, prices are expected to come down after GST. Manufacturers will save on costs through efficient management of inventory and by consolidating their warehouses. Handset manufacturers will find it easier to sell their equipment as GST will negate the need to set up state-specific entities, and transfer stocks. They will also save up on logistics costs.

Textile

The Indian textile industry provides employment to a large number of skilled and unskilled workers in the country. It contributes about 10% of the total annual export, and this value is likely to increase under GST. GST would affect the cotton value

chain of the textile industry which is chosen by most small medium enterprises as it currently attracts zero central excise duty (under optional route).

Real Estate

The real estate sector is one of the most pivotal sectors of the Indian economy, playing an important role in employment generation in India. The probable impact of GST on the real estate sector cannot be fully assessed as it largely depends on the tax rates. However, it is a given that the sector will see substantial benefits from GST implementation, as it will bring to the industry much required transparency and accountability.

Agriculture

Agricultural sector is the largest contributing sector the overall Indian GDP. It covers around 16% of Indian GDP. One of the major issues faced by the agricultural sector is transportation of agri products across state lines all over India. It is expected through GST to resolve the issue of transportation. GST may provide India with its first National Market for the agricultural goods.

However, there are a lot of clarifications which need to be provided for rates for agricultural products.

FMCG

The FMCG sector could see significant savings in logistics and distribution costs as the GST will eliminate the need for multiple sales depots. The GST rate for this sector is around 17% which is way lesser than the 24-25% tax rate paid currently by FMCG companies. This includes excise duty, VAT and entry tax - all of which will be subsumed by GST.

Freelancers

Freelancing in India is still a nascent industry and the rules and regulations for this chaotic industry are still up in the air. But with GST, it will become much easier for freelancers to file their taxes as they can easily do it online. In the GST regime, they are taxed as service providers and the new tax structure brought clarity and accountability in this sector.

Automobiles

There is huge benefit with GST on cars. GST actually provide the best benefits to the buyers. The automobile industry in India is a vast business producing a large number of cars annually, fueled mostly by the huge population of the country. Under the current tax system, there are several taxes applicable on this sector like excise, VAT, sales tax, road tax, motor vehicle tax, registration duty which will be subsumed by GST. Though there is still some ambiguity due to tax rates and incentives/exemptions provided by different states to the manufacturers/dealers for manufacturing car/bus/bike, the future of the industry looks rosy.

Startups

With increased limits for registration, a DIY compliance model, tax credit on purchases, and a free flow of goods and services, the GST regime truly augurs well for the Indian startup scene.

Currently, many Indian states have very different VAT laws which can be confusing for companies that have a pan-India presence, especially the e-com sector. All of this is expected to change under GST with the only sore point being the reduction in the excise limit.

Banking, Financial Services and Insurance (BFSI)

Among the services provided by Banks and NBFCs, financial services such as fund based, fee-based and insurance services will see major shifts from the current scenario. Owing to the nature and volume of operations provided by banks and NBFC vis a vis lease transactions, hire purchase, related to actionable claims, fund and non-fund based services etc., GST compliance will be quite difficult to implement in these sectors.

CONCLUSION

GST, the biggest tax reform in India founded on the notion of "One nation, one market, one tax is finally here. The moment that the Indian Government was waiting for a decade has finally arrived. The single biggest indirect tax regime has

kicked into force, dismantling all the inter- state barriers with respect to trade. The rollout has renewed the hope of India's Fiscal reform program regaining momentum and widening the economy.

GST is at the infant stage in Indian economy. It will take some time to experience its effects on Indian economy. GST mechanism is designed in such a way that it is expected to generate good amount of revenue for both central and state government. Regarding corporate, businessmen and service providers it will be beneficial in long run. It will bring transparency in collection of indirect taxes benefiting both the Government and the people of India.

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A STUDY ON CLUSTERING TECHNIQUES FOR DATA MINING

Dr. Pramod Kumar and Ankur Rohilla

SRC, Muzaffarnagar

ABSTRACT

Abstract: Extraction of useful information from huge amount of data is known as data mining also known as knowledge discovery in database (KDD). There are so many sources that generates data in a very large amount like social networking sites, camera, sensors etc. This is the main reason that data mining is increasing rapidly. This paper presents a survey of clustering techniques and tools used for data mining. Classification is a supervised learning technique in which it identifies the class of unknown objects whereas clustering is an unsupervised learning. Clustering is the process of partitioning a set of data objects into subsets. Objects with in a cluster are more similar and dissimilar to other clusters. The similarity between objects are calculated using various distance measures like Euclidean distance, Manhattan distance, cosine etc.

Keywords- Data Mining, Machine Learning, Classification, clustering algorithms, Supervised, Unsupervised Learning

INTRODUCTION

Data mining plays a very important role for finding the frequent data pattern from internet, data set, data warehouse, data mart etc. Data mining, also called as data archeology, data dredging, data harvesting, is the process of extracting hidden knowledge from large volumes of raw data and using it to make critical business decisions. Data mining is used in various applications like finance, marketing, banking, credit card fraud detection, whether prediction.

Data mining helps to extract hidden patterns and make hypothesis from the raw data. Data mining process has mainly 7 steps as Data integration, data cleaning, data selection, data transformation, data mining, pattern evaluation and knowledge representation [1]. This process is shown in Fig-1.

Data Cleaning: Data in the real world is dirty, means incomplete, noisy and inconsistent data. Quality decisions must be based on quality data. So, before performing the analysis on the raw data, data cleaning is performed, which includes the following tasks:

Filling missing values.

Smooth noisy data and remove outliers by using algorithms like Binning algorithm. Resolve inconsistencies.

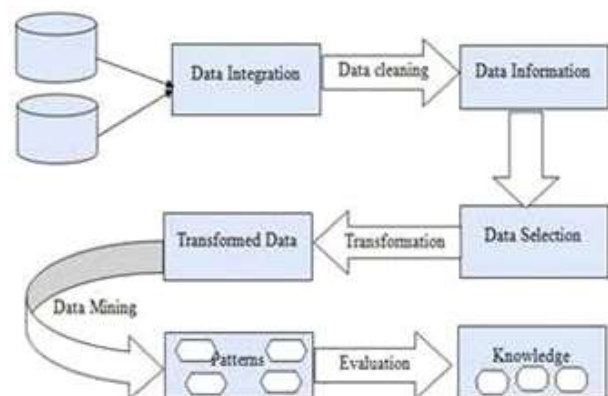


Figure 1: Data Mining Process

Data Integration: where multiple heterogeneous data sources may be combined.

Data Selection: Where task relevant data are selected from data warehouse or any other data sources including www, RDBMS etc.

Data Transformation: In data transformation, the

data are transformed into format appropriate for data mining. For ex: An attribute data may be normalized

So as to fall between a small range 0 to 1. It includes the following tasks:

Smoothing: which works to remove noise from the data. Such techniques include binning, regression and clustering.

Aggregation: Various aggregation operations such as mean and median are applied to the data. For ex: the daily sales data may be aggregated.

Normalization: where the attribute data are scaled so as to fall within a small specified range, such as 0 to 1.

Data Mining: It is the process of extraction of interesting information or patterns from data in large database is known as data mining.

Pattern Evaluation: This component typically employs interestingness measures and interacts with the data mining modules so as to focus the search towards interesting patterns.

Knowledge representation: Various visualization and knowledge representation techniques are used to present the extracted knowledge to the user.

The rest of the paper is organized as follows. The section II provides a brief overview of the literature survey related to the clustering and classification learning algorithms. The section III explain about various clustering algorithms and the section IV provides the overview of data mining tools. Finally, section V concludes the work and provides future work.

RELATED WORK

A lot of researchers have implemented various data mining approaches in order to solve the various problems related to forecasting and analysis.

Nisha et al. [2] [2015] presented comparative study

of clustering techniques. Clustering algorithms like K-means, K-medoid, Agglomerative are used for segmentation. Clustering is an unsupervised learning in which no target classes are defined. Algorithms learn from their experience and divide the data set into many clusters on the basis of similarity between data objects. Objects in a cluster have higher similarity as compared to other clusters.

Anna L. et al. [3] [2016] presented a literature of machine learning algorithms used for cyber security intrusion detection. There are three main types of cyber analytics in support of IDSs: misuse-based (sometimes also called signature based), anomaly-based, and hybrid. Misuse-based techniques are designed to detect known attacks by using signatures of those attacks. They are effective for detecting known type of attacks without generating an overwhelming number of false alarms. They require frequent manual updates of the database with rules and signatures. Misuse-based techniques cannot detect novel (zero-day) attacks.

Yong wang et al. [4] [2011] presented a survey of various data mining tools used for real world projects to perform prediction, analysis tasks and many more. This paper presented a comparative study between open source and commercial data mining tools. As it reports there have been more than 600 data mining software's in the world, and based on a tree hierarchy relationship with links it builds a classification framework to category all the software's into 21 groups as Classification software, Clustering and Segmentation software, Social Network Analysis, Link Analysis, and Visualization software, Statistical Analysis software, Text Analysis, Text Mining and Information Retrieval (IR), Visualization software, Web Analytics software, Web Usage Mining, Agents, Association rules and market basket analysis,

Audio and Video Mining, Bayesian and Dependency Networks, BI (Business Intelligence), Database and OLAP software, Data Transformation, Data Cleaning, Data Cleansing, Deviation and Fraud Detection.

Maitri P. Naik et al. [5] [2015] presented a survey on document clustering. Clustering is the process of partitioning a set of data objects into subsets. It is commonly used technique in data mining, information retrieval, and knowledge discovery for finding hidden patterns or objects from a data of different category. Text clustering process deals with grouping of an unstructured collection of documents into semantically related groups. A document is considered as a bag of words in traditional document clustering methods; however, semantic meaning of word is not considered. Thus, more informative features like concept weight are important to achieve accurate document clustering and this can be achieved through semantic document clustering because it takes meaningful relationship into account. This paper highlights major challenges in traditional document clustering and semantic document clustering along with brief discussion.

Ashish Dutt et al. [6] [2016] presented a systematic review on educational data mining. Presently educational institutions compile and store huge volumes of data such as student enrolment and attendance records, as well as their examination results. Mining such data yields stimulating information that serves its handlers well. Rapid growth in educational data points to the fact that distilling massive amounts of data requires a more sophisticated set of algorithms. This issue led to the emergence of the field of Educational Data Mining (EDM). Traditional data mining algorithms cannot be directly applied to educational problems, as they may have a specific objective and function. This implies that a preprocessing algorithm has to be enforced first and only then some specific data mining methods can be applied to the problems. One such preprocessing algorithm in EDM is Clustering.

Hussain Ahmad Madni et al. [7] [2015] presented a survey on data mining techniques and applications. Data mining also known as knowledge discovery in database (KDD). It is defined as the process of extracting useful information from huge amount of

data. In this paper various data mining techniques like classification and clustering are discussed. Classification is a twostep process. In the first step training is done and in next step testing of the system is performed. In classification, an object is classified into the predefined class. Whereas, in clustering the data set is partitioned into the clusters on the basis of similarity.

Sivaramakrishnan R Guruvayur et al. [8] [2017] provides a survey on Machine learning techniques for data mining. Throughout the year's data mining has delighted in enormous achievement, the application domains extended persistently yet the mining methods additionally kept up moving forward.

Various issues have developed and solution have found by data mining scientists. In any case, there are ranges and issues that still require consideration for future upgrades in this innovation. More research on the most proficient method to manage the social issue of in some cases, unconscious and unsuspecting people's security require to be conducted. Data mining procedures should accordingly develop to coordinate with this challenge.

Jinwook Seo et al. [9] [2006] We believe that the guiding GRID principles and, especially, the rank-by-feature framework can be useful to designers of other information visualization tools. Since it is difficult to conduct controlled experiments on complex tools that require substantial training and changes to analytic processes, we conducted three longitudinal case studies and an e-mail user survey.

A.Vinothini et al. [10] [2017] presented a review on machine learning methods for big data applications. Big data is described with 8 V's: Volume, Value, Veracity, Visualization, Variety, Velocity, Viscosity and Virality. Volume talks about the quantity of produced and warehoused data. Value refers to our ability to turn our data into value. Quality of captured data can vary significantly. Visualization tools present the information in a

manner that is easy for the end user to understand and interpret. Data today comes in many different formats like structured data, unstructured data, semi-structured data, and even complex structured data. Velocity refers to the speed at which the data is generated and processed to meet the demands and challenges that lie in the path of growth and development. Viscosity measures the confrontation to flow in the volume of data. Virality describes how quickly information gets spread across network. Rate of speed is measured with respect to time

Paritosh Nagarnaik et al. [11] [2015] presented a survey on recommendation system. Recently several recommendation systems have been proposed, that are based on collaborative filtering, content based filtering and hybrid recommendation technique. Collaborative filtering technique (CF) is one of the most successful recommendation techniques to solve the scalability problem related to recommendation system and also providing better recommendation. In this paper cover all collaborative based recommendation techniques which are used for better recommendation. Also proposed new improve collaborative filtering technique using Hybrid recommendation which is combination of both K-mean algorithm and CHARM algorithm. This Hybrid recommendation method improves the prediction quality of recommendation system.

CLUSTERING ALGORITHMS:

Clustering is an essential technique in data mining in which a group of data objects is taken as input and as an output of number of clusters are obtained so that the objects in a group are more similar but are dissimilar to objects outside the clusters [12]. Clustering is also known as unsupervised learning because in clustering no target output is defined. Clustering algorithms are learning from their experience. Clustering is also used to detect outliers. An outlier is a value that do not belong to any cluster. Figure 2 shows outlier value and clusters.

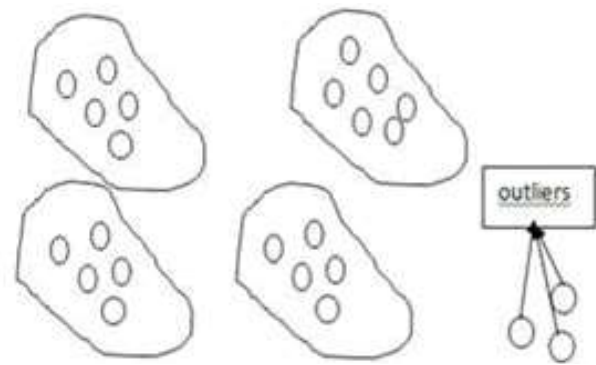


Figure 2: Clusters and Outliers

In various fields there are many benefits to be had from grouping similar objects. For example:

In a finance application we analyse the performance of companies by making clusters.

In a banking application we categorize the customers into various categories like profitable and non-profitable.

In a crime analysis application, we might look for clusters of high crimes such as burglaries or murders.

Types of Clustering Algorithms:

Figure 3 shows the various types of clustering algorithms:

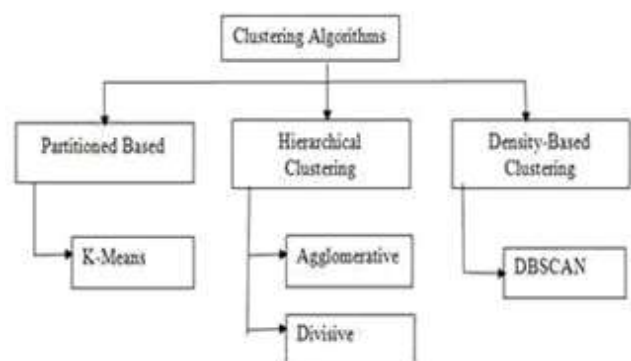


Figure 3: Types of Clustering algorithms

A. Partitioned based clustering:

In Partitional clustering a number of n objects data set is given as input and the data set is partitioned

into the k cluster where $k \leq n$. The k cluster satisfies the following two conditions: 1) Every object must belong to at least one cluster 2) The cluster must contain at least one object.

K-Means Algorithm:

K-means clustering is a method of cluster analysis which main aim to partition a set of n observations in to given k clusters. Figure 4 shows how the algorithm works?

Algorithm:

Input: Data set S having n observations and number of cluster K .

Output: K clusters

Step 1: The algorithm randomly selects k points as the initial cluster centroid.

Step 2: Calculate the distance of each point in data set S with every cluster centroid and assigned to the closed cluster.

Step 3: Recomputed the mean of each cluster.

Step 4: Repeat step 2 and 3 until the centroids no longer move.

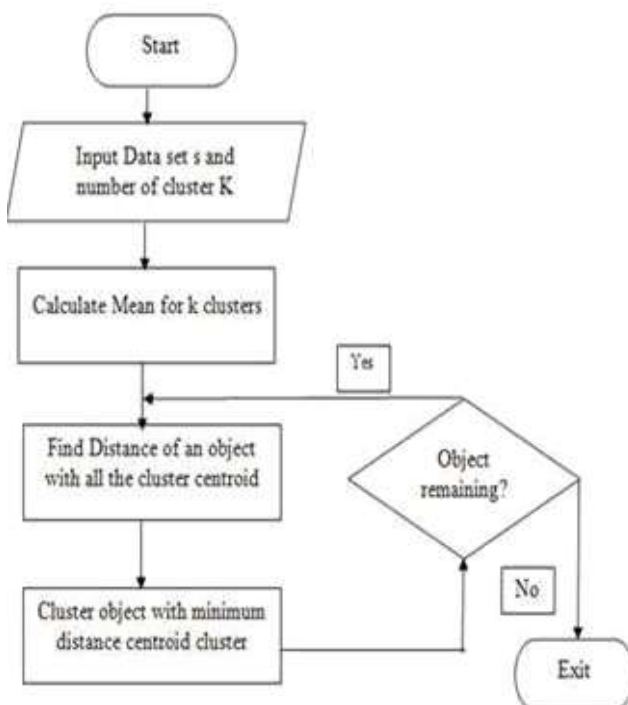


Figure 4: K-Means Flowchart

B. Hierarchical clustering:

Hierarchical clustering is a method of cluster analysis

in which hierarchy of clusters is created in such a way that the data objects in clusters are decomposed based on some criteria. The clusters thus obtained in hierarchy are known as dendrogram that shows how the clusters are related to each other [2]. There are mainly two approaches to generating a hierarchical clustering: Figure 5 shows how both the algorithms works?

Agglomerative:

In this algorithm starts with the points as individual clusters and at every step, merge the closet pair to form a cluster. This process is repeated until single cluster is formed having all the points.

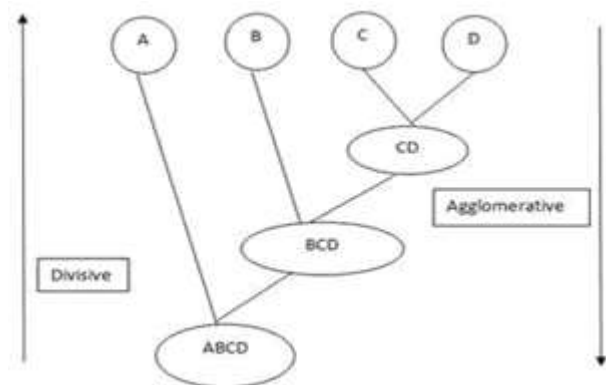


Figure 5: Agglomerative and Divisive Algorithms

Divisive:

In divisive, all of the objects are used to form one initial cluster. The cluster is split according to some principle, such as the maximum Euclidean distance between the closest neighboring objects in the cluster. This process is repeated until each cluster contains only a single object.

C. Density based clustering:

This technique of clustering is suitable for the arbitrary shaped clusters. Density based clustering helps us to separate the low dense regions of the clusters from the high dense regions. High dense regions of objects are combined together to form clusters. It deals with the noisy data and scans the whole data in only one scan [2].

DBSCAN (Density - Based Spatial clustering of Applications with noise):

DBSCAN is a density-based clustering algorithm. The algorithm grows regions with sufficiently high density into clusters, and discover clusters of arbitrary shape in spatial databases with noise. It defines a cluster as a maximal of density-connected points. Two parameters are used:

Eps: It defines maximum radius of the neighborhood.

MinPts: It represents minimum number of points in an Eps-neighborhoods of that point.

A point is a core point it has more than a specified number of points (MinPts) within Eps. A border point has fewer than MinPts within Eps, but is in the neighborhood of a core point. A noise point is any point that is not a core point or a border point.

Algorithm:

1. Select a point p.
2. Retrieve all points density reachable from p with respect to Eps and MinPts.
3. If p is a core point, a cluster is formed.
4. If p is a border point, no points are density-reachable from p and DBSCAN visits the next point of the database.
5. Repeat this process until all of the points have been processed.

CONCLUSION

In this paper, we have presented the survey of clustering algorithms and data mining tools used for analysis. There are mainly three types of clustering methods are discussed. In partition based clustering, the data set is divided into k clusters containing similar objects. In partitioned clustering, overlapping clusters are not allowed. In hierarchical clustering, overlapping clusters are allowed. In density based algorithms, an arbitrary shape clusters are formed. Density based method help us to differentiate between the low dense regions of the clusters from the high dense region. In future we will discuss more types of clustering algorithms.

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SIGNIFICANCE OF SPECTRAL CURVE IN FACE RECOGNITION

Neeraj Pratap¹, Shwetank Arya², Nishant Rathi³

¹Assistant Professor , Lovely Professional University, Phagwara

²Dept. of Computer Science, GKV, Haridwar

³Assistant Professor & HOD, Department of Computer Applications
Sri Ram Group of Colleges, Muzaffarnagar

ABSTRACT

In this paper, we present the introduction and significance of spectral signature and recognition of skin from hyperspectral face imagery for Face Recognition (FR). In the acquisition step, hyperspectral cameras are used to capture multispectral or hyperspectral images of faces for skin recognition. The developed signature may either be stored in a database for forthcoming testing or be used for purposes of identification. The spectral properties of human tissue are approximately invariant to face orientation and expression which allows hyperspectral discriminants to be used for recognition over a large range of poses and expressions.

Keywords: *Hyperspectral, Spectral, Face Recognition*

INTRODUCTION

Biometrics is the technical term for body measurements and calculations. It refers to metrics related to human characteristics. Biometrics authentication is used in computer science as a form of identification and access control [1]. Examples include, but are not limited to fingerprint, palm veins, face recognition, DNA, palm print, hand geometry, iris recognition, retina and odour. Behavioral characteristics are related to the pattern of behavior of a person, including but not limited to typing rhythm, gait, and voice. Among the various biometric identification methods, Face Recognition (FR) is one of the most flexible, working even when the subject is unaware of being scanned [2].

1.1 Face Recognition

FR is a significant research problem covering many fields and disciplines. This because FR, in addition to having frequent practical applications such as bankcard identification, access control, Mug shots searching, security monitoring, and surveillance system, is a fundamental human behaviour that is essential for effective communications and interactions among people [3]. Progress has advanced to the point that FR systems are being

established in real-world settings. The rapid development of FR is due to a combination of factors: active development of algorithms, the availability of a large databases of facial images, and a method for evaluating the performance of face recognition algorithms [4].

FR is a biometric approach that employs automated methods to verify or recognize the identity of a living person based on his/her physiological characteristics [5]. In general, a biometric identification system makes use of either physiological characteristics or behaviour patterns to identify a person. Because of human inherent protectiveness of his/her eyes, some people are reluctant to use eye identification systems. FR has the benefit of being a passive, non-intrusive system to verify personal identity in a "natural" and friendly way [6].

The application of face recognition technique can be categorized into two main parts: law enforcement application and commercial application. Face recognition technology is primarily used in law enforcement applications, especially Mug shot albums and video surveillance [7]. The commercial applications range from static matching of

photographs on credit cards, ATM cards, passports, driver's licenses, and photo ID to real-time matching with still images or video image sequences for access control. Each application describe diverse restraints in terms of handling.

1.2 Hyperspectral Face Imaging

Hyperspectral facial data presents creative information, taken with Hyperspectral camera, as compared to the traditional camera and images. This facial spectral dataset is a rich source of information extraction and analysis over traditional single band data with constant wavelength of Electromagnetic Spectrum (EMS) [8]. A hyperspectral image is a data cube with two spatial dimensions and one spectral dimension. It is captured by a hyperspectral camera which operates in multiple narrow bands and densely samples the radiance information in both space and wavelength, producing a radiance spectra at every pixel [9].

Although the high dimensionality of hyperspectral data is a desirable feature for separating the different identities, at the same time it poses new challenges such as interband misalignments and low signal-to-noise ratio (SNR) in certain spectral bands [10].

1.3 Significance of Hyperspectral Imaging in FR

Using Hyperspectral Images for FR is reasonable by two principal reasons: Narrow spectral bands

display more relevant facial information compared to orthodox broadband color and black and white images [11]. Certainly, we obtain a unique spectral signature of the facial tissue. Such information can be employed to improve the accuracy of FR. Second, by using Hyperspectral images, we are able to distinct the illumination information from object reflectance in distinction to broadband images where it is almost unbearable to do so. This separated information can be used to normalize the images. For example, Near-Infrared (NIR) spectral band can be joined with the visible image. This method has been widely used to build more operative biometric systems [12].

1.4 Spectral Curves

Reflectance of the surface of a material is its effectiveness in reflecting radiant energy. It is the fraction of incident electromagnetic power that is reflected at an interface. The reflectance spectrum or spectral reflectance curve is the plot of the reflectance as a function of wavelength.

The measurements can be made with various instruments, including a task specific spectrometer, although the most common method is separation of the red, green, blue and near infrared portion of the EM spectrum as acquired by digital cameras. Calibrating spectral signatures under specific illumination are collected in order to apply an empirical correction to airborne or satellite imagery digital images [13]. Spectral Curves for different facial attributes are shown with Figure 1[14].

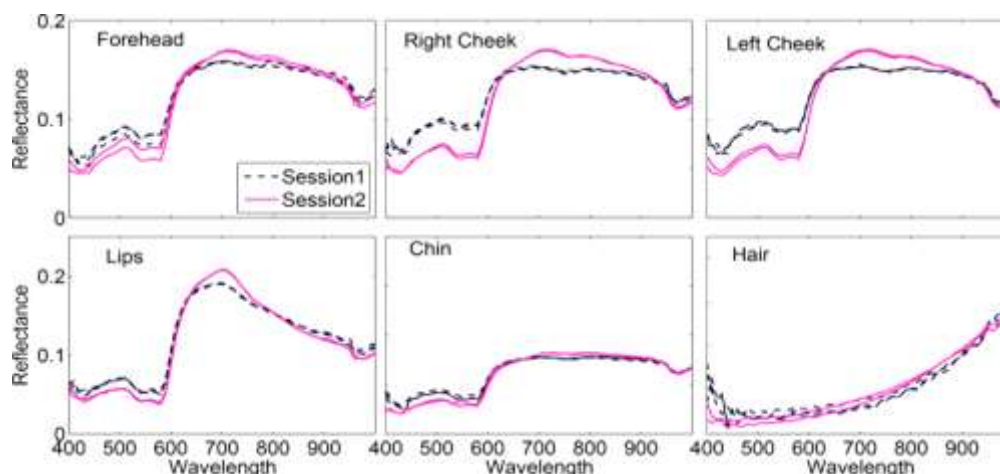


Figure 1. Spectral Curves for different Face Attributes [14]

SIGNIFICANCE OF SKIN SPECTRAL CURVES IN FACE RECOGNITION

Spectral dimensions from human tissue, for example, have been used for numerous years for characterization and observing applications in biomedicine. In remote sensing, scholars have shown that hyperspectral data are operative for material identification in scenes where other sensing modalities are unsuccessful. The introduction of hyperspectral cameras has led to the expansion of methods that syndicate spectral and spatial information. As hyperspectral cameras have become accessible, computational methods developed primarily for remote sensing problems have been moved to biomedical applications. Since the vast person-to-person spectral variability for different tissue types, hyperspectral imaging has the capability to expand the capability of automated systems for human identification [11].

Numerous of the boundaries of current FR systems can be overwhelmed by using spectral information. The interface of light with human tissue has been studied widely by several researchers and concludes tissue spectral properties. The epidermal and dermal layers of human skin establish a scattering medium that comprises numerous pigments such as melanin, hemoglobin (HbO₂), bilirubin, and carotene. Minor variations in the distribution of these pigments make significant variations in the skin's spectral reflectance. Recent research has measured skin reflectance spectra over the visible wavelengths and proposed models for the spectra [11].

Scholars have used a skin reflectance model to propose method for skin detection under changing lighting circumstances. A skin reflectance model has also been used to synthesize face images after changes in lighting and viewpoint.

CONCLUSION

We have proven the utility of hyperspectral imaging for face recognition over time in the presence of changes in facial pose and expression. The hyperspectral imaging provides accurate recognition performance for expression changes and for images acquired over several week time intervals.

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THE COVID-19 LOCKDOWNS IMPACT ON: EARTH, ECONOMIC AND ENVIRONMENTAL

¹Vikas Kumar and ²Surbhi Aggarwal

¹Assistant Professor, Department of Computer Application,
SRC, Muzaffarnagar, Uttar Pradesh, INDIA.

²Student, Department of Computer Application,
SRC, Muzaffarnagar, Uttar Pradesh, INDIA.

*Corresponding Author's Email ID: kspvikas@gmail.com)

At present the whole world is encountering the destruction and demolition of a lethal infection, the new sickness of COVID-19, arising out of the new Covid SARS-CoV 2, has spread all through the world, influencing in excess of 200 nations and many individuals, with debilitating bleakness and mortality figures. This began toward the finish of December 2019, explicitly on the 31st, where the Chinese Disease Control Center announced 27 instances of patients with pneumonia of unsure etiology and who shared practically speaking a Hunan fish market that it needed sterile measures, cautioning of a potential zoonosis. On January 7 its causal specialist was distinguished, which was a Covid and it was called with the name of the new Covid (2019-nCoV). The analysts delimited the 2019-nCoV grouping with that of other infections through an information base of hereditary successions, finding that the most related were two infections of Chiropter beginning as shown by their logical name (bats), (bat-SL - CoVZC45 and bat-SLCoVZXC21). Restrictions to lessen human association have assisted with staying away from more prominent misery and demise from the COVID-19 pandemic, yet have likewise made a financial difficulty.

The worldwide episode of Covid infection 2019 (COVID-19) is influencing all aspects of living souls, including the actual world. The actions are taken to control the spread of the infection and the lull of financial exercises effectively affect the climate. Consequently, this investigation means to investigate the earth, economy natural effects of the COVID-19 pandemic, by auditing the accessible logical written works. This examination shows that

the pandemic circumstance essentially improves air quality in various urban areas across the world, diminishes GHGs emanation, decreases water contamination and commotion, and lessens the tension on the traveler objections, which may help with the reclamation of the natural framework. What's more, there are additionally some unfortunate results of COVID-19, like increment of clinical waste, random use and removal of sanitizers, cover, and gloves; and weight of untreated squanders persistently jeopardizing the climate. It appears to be that, financial exercises will return not long after the pandemic, and the circumstance may change. It is normal that the legitimate execution of the proposed procedures may be useful worldwide.

This interruption is remarkable in the advanced time of worldwide noticing networks, inescapable detecting, and huge scope following of human portability and conduct, making a novel proving ground for understanding the Earth System. In this Perspective, we estimate the quick and long haul Earth System reactions to COVID-19 along two multidisciplinary falls: energy, discharges, environment and air quality; and destitution, globalization, food, and biodiversity. While momentary effects are overwhelmed by direct impacts emerging from decreased human action, longer-enduring effects are probably going to come about because of falling impacts of the financial downturn on worldwide neediness, green speculation and, human behavior. The vulnerability about the length of protecting requests - and the idea of any mediations that may follow - it is difficult to realize how long this accidental trial will last.

This vulnerability gives inspiration to recording theories during this underlying phase of the worldwide emergency, so information can be accumulated and assessed inside the structure of deduced forecasts, as opposed to posting examinations. Except if denied by security concerns, it is significant that this information keeps on being gathered so the Earth System reaction to COVID-19 can be perceived. By producing explicit theories dependent on introductory perceptions, existing observational connections, and cycle-based models, and afterward testing those speculations with existing and novel information sources, the COVID-19 financial disturbance can give novel experiences into the cycles that oversee Earth System capacity and change. Examination of the Earth System reaction can empower early identification of focal points of natural danger or debasement arising during the occasion. Likewise, anticipating, checking, and understanding Earth System cycles can assist with supporting a feasible financial, social, and ecological recuperation from the occasion. Despite the fact that there is a vulnerability about the length of the pandemic, the financial impacts appear to probably keep going for quite a long time. The individual, cultural and government reactions to these financial impacts will impact the drawn-out direction of the human impression on the Earth System.

The World Health Organization (WHO) on twelfth March declared the new flare-up of the novel Covid illness (COVID-19) a pandemic, disintegrating away Rs. 11.4 trillion of investor's wealth. India's economy has effectively been experiencing stoppage in the new past. Moody's has downsized India's development to 5.3% in 2020 because of the disadvantaged dangers of Covid-19, the slowest in 11 years. As per a financial analyst, 'The inventory side virus impact' will affect assembling, farming, and the drug business. Covid has carried different portions to stand still. Sectors like the travel industry, flying, friendliness, and exchange will confront the primary arrangement of difficulties; different areas also will confront the cyclic impact. According to reports, there has been a 20% decrease

in homegrown travel and about a 75% decrease in worldwide travel appointments. In booking, rates have additionally declined from 70% to 20%. There has been a down of 30-35% in the eatery business. Deals of poultry area have likewise descended by 80% losing a business of roughly Rs 1,500 - 2000 crores day by day. India's ongoing GDP losses are probably going to be approx. \$5-10 billion (0.15 - 0.35 percent of GDP), according to information. With an over 20% cut in benchmark records; the Indian value market has entered the bear market area. New Covid has additionally determined financial backers to offer up security costs, bringing about yields in significant economies to inch lower. Exacerbating the situation is the unrefined petroleum battle between Saudi Arabia and Russia, which has infused instability into different resources. Areas like paints, strength synthetic substances, hair oil, concrete, PVC pipes, and so forth will profit because of a fall in unrefined costs. The homegrown utilization log jam, set off by the disappointment of huge monetary establishments has prompted another circumstance as Yes Bank emergency. While different wares are down, gold has gone up on account of the interest for a place of refuge in uncertainty. RBI is finding a way important ways to meet emergency circumstances in the country. RBI concocted Business Continuity Plan in the arising circumstance and is sharing guidelines, by formulating systems between the staff part and different clients. RBI has additionally begun Open Market and RBI has a willful roof of Rs 10,000 crore wherein they have the sole option to choose the acquisition of individual protections, acknowledge offer either less or higher than the measure of Rs 10,000 crores, and tolerating or dismissing the offer.

Confined human association with nature during this emergency time has shown up as a gift for nature and climate. Reports from everywhere the world are demonstrating that after the flare-up of COVID-19, natural conditions including air quality and water quality in waterways are improving and untamed life is sprouting. India has consistently been a center of contamination with a colossal populace,

substantial deals, and dirtying ventures prompting high air quality record (AQI) values in every single significant city. In any case, after the presentation of lockdown because of COVID-19, the nature of air has begun to improve and any remaining ecological boundaries, for example, water quality in waterways have begun offering a positive hint towards reestablishing. An endeavor has been made to imagine the improvement noticeable all-around quality utilizing devices like satellite pictures of Indian air, consequences of on-location ongoing checking at explicit areas (Ghaziabad-most noteworthy contaminating city of India), and Air quality file (AQI) determined by focal contamination control leading group of India. But as the human exercises are limited in the vast majority of the spaces, the common habitat of the nation has begun recuperating itself. Plants, transport, vehicles, and aeronautics have all come to a standstill. Fossil fuel byproducts have diminished and the nature of air has seen an extraordinary improvement. It is noteworthy to see a decrease of 85.1% in PM_{2.5} fixation in one of India's most contaminated city (Ghaziabad), when contrasted with the focus only three months back. Different boundaries like PM₁₀, NO₂, and CO has likewise diminished unmistakably which is the aftereffect of confined human exercises and mechanical developments. Satellite pictures of Indian air additionally mirror a similar pattern of decrease in air contamination after COVID-19 flare-up. The Air quality file (AQI) in every one of the territories of India is presently in two figures (demonstrating decently great nature of air) after this lockdown. Air, as well as the waterways of India like Ganga, Yamuna, and Cauvery, and so on have become spotless and clear, and marine life is noticeable. Subsequent to evaluating different reports as referred to prior, it tends to be summed up that without a doubt COVID-19 has brought an unfortunate destroying scourge for a person however it has arisen as a gift for indigenous habitat giving it a "recuperation time". We have additionally discovered that the ecological debasement brought about by people isn't absolutely irreversible. In a time of only 1-2 months,

"recuperation of nature" is being seen by everybody. This is a sign for us to comprehend and respond. Government and Policy producers should make fundamental strides with the goal that this recuperating interaction doesn't turn into something impermanent. The examination centers around the progressions in air quality during the lockdown time frame. There is a requirement for thorough examination on the impact of the execution of such transient lockdown as an elective measure for contamination decrease and its impact on the economy. This examination may likewise be utilized as a kind of perspective record to investigate post-Coronavirus condition also to break down the impact of decreased contamination on wellbeing information of delicate receptors. At present when the whole globe is battling to outline appropriate procedures to battle Covid-19, the early lockdown executed has shown a flat-out path towards reestablishing the biological system and climate. Corona virus has overturned social orders and significantly adjusted regular day-to-day existence across the globe. Our current conditions, while extraordinary, have been significantly formed by persevering cultural real factors-like settled in racial and financial disparity, the expansion of deception, and nerves about the capacity of the world's popular governments to go up against major. Unless denied by security concerns, it is significant that this information keeps on being gathered so the Earth, Economy, Environment System reaction to COVID-19 can be gotten emergencies. Inside and out friendly arrangement will be indispensable to capturing the emergency and graphing a way ahead. As they say, each cloud has a silver coating. Leader Modi guaranteed that the public authority is with us and we need to help ourselves by going through self-isolate. As residents, we need to battle the worldwide emergency by holding hands and adhere to fundamental wellbeing and cleanliness guidelines, coordinated by the Government of India. We should be cautious towards our activities and together we will defeat this infection and will make this planet a superior spot to live. Expectation the market tension will fade away soon and the economy will take a potential gain.

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