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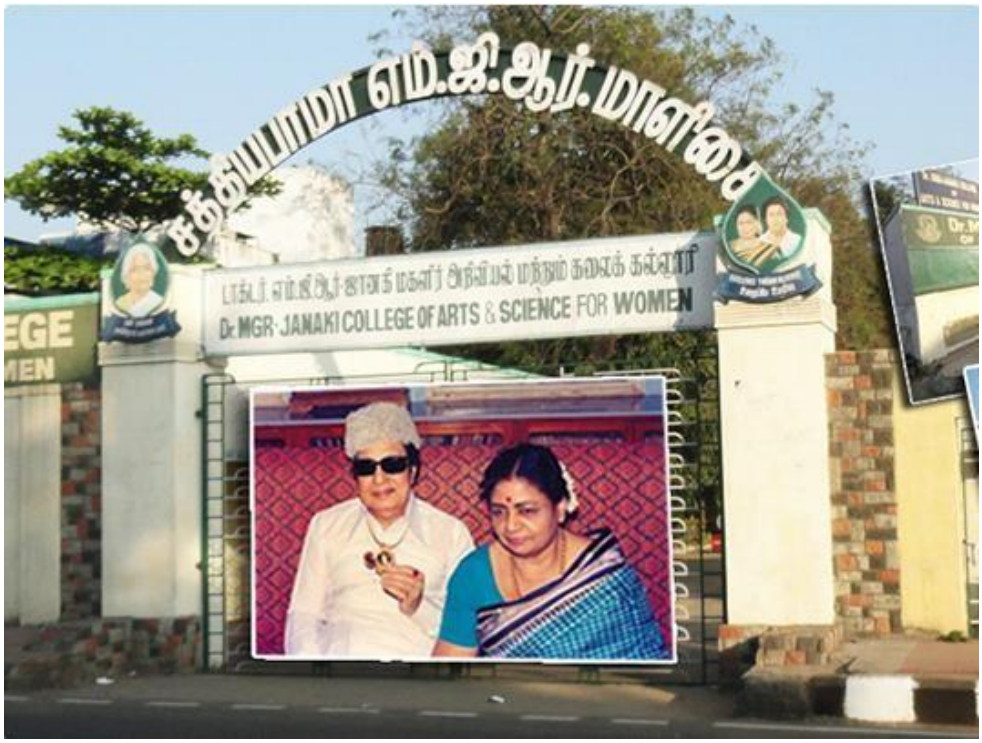

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Page No 7 to 21

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S.NO	TITLE OF PAPER	NAME OF THE AUTHOR/S
1	ROLE OF DEMOGRAPHICS IN THE BEHAVIOURAL CHANGES OF CONSUMERS - A STUDY WITH REFERENCE TO DURABLE PRODUCTS IN CHENNAI CITY	C.SHALINI E.NIRMALA
2	IMPACT OF ADVERTISEMENT ON THE PURCHASE DECISION OF PRODUCTS IN CHENNAI CITY	C.SHALINI E.NIRMALA
3	INFLUENCE OF CONSUMER BUYING BEHAVIOUR TOWARDS E-RETAILING	A.RAVIKUMAR V.JEEVA
4	A STUDY ON CONSUMER SATIFICATION TOWARDS E-RETAILING	A.RAVIKUMAR V.JEEVA
5	VALIDITY OF FACTIRS DETERMINING CONSUMER ATTITUDE TOWARDS DURABLE PRODUCTS IN CHENNAI	C.SHALINI E.NIRMALA
6	TOXICITY STUDY OF THE ETHANOLIC EXTRACT OF MORINGA CONCANENSIS NIMMO LEAVES IN WISTAR RATS	BRINDHA BANU
7	MORINGA CONCANENSIS NIMMO AMELIORATES HYPERGLYCEMIA IN 3T3-L1 ADIPOCYTES BY UPREGULATING PPAR-纬, C/EBP-伪 VIA AKT SIGNALLING PATHWAY AND STZ-INDUCED DIABETIC RATS	BRINDHA BANU
8	EVALUATION OF FREE RADICAL SCREENING AND ANTIOXIDANT POTENTIAL OF MORINGA CONCANENSIS NIMMO- A MEDICINAL PLANT USED IN INDIAN TRADITIONAL MEDICATION SYSTEM	BRINDHA BANU
9	HUMAN RESOURCE MANAGEMENT ISSUES IN MICRO, SMALL AND MEDIUM ENTERPRISES IN TAMIL NADU	K. SUCHARITHA
10	EMPLOYEE PERCEPTION TOWARDS HR PRACTICES IN SME'S IN AMBATTUR INDUSTRIAL ESTATE.	K. SUCHARITHA
11	ON CERTAIN CLASSES OF SAKAGUCHI TYPE FUNCTIONS, MATHEMATICAL SCIENCES	V. AGNES S.J. LAVANYA, M.P. JEYARAMAN AND H. AAISHA FARZANA
12	AN APPLICATION OF TODIM FOR MULTI CRITERIA DECISION MAKING UNDER INTUITIONISTIC FUZZY ENVIRONMENT	P.LAKSHMI GAYATHRI DR.M.MARAGATHAM
13	ON GRAPH LABELING THROUGH PAIR LABELING	V.VISHNUPRIYA AND J.BASKAR BABUJEE
14	PRODUCTION, CHARACTERIZATION AND EMULSIFYING PROPERTY OF EXOPOLYSACCHARIDE PRODUCED BY MARINE ISOLATE OF PSEUDOMONAS FLUORESCENS	R. VIDHYALAKSHMI,C. VALLI NACHIYAR,G. NARENDRA KUMAR,SWETHA SUNKAR,IFFATH BADSHA
15	GROWTH MEDIUM OPTIMIZATION FOR CALCITE PRECIPITATION USING RESPONSE SURFACE METHODOLOGY	NEENA PRIYA

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ROLE OF DEMOGRAPHICS IN THE BEHAVIOURAL CHANGES OF CONSUMERS – A STUDY WITH REFERENCE TO DURABLE PRODUCTS IN CHENNAI CITY

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Abstract : In India, consumer behaviour doesn't remain constant in the current marketing situations and these behavioural changes happened from time to time. The durable products industry is functioning in a highly competitive, complex and promptly changing the business environment. There are various demographic factors like age, sex, marital, household income, size of the family, education level, occupation, background, psychological factors which affect the buying behaviour of the consumers. This paper focused on the role of demographic variables in the behavioural changes of consumers of durable products in Chennai city. This study analyzed the factors responsible for the demographic variables among consumer of durable products. The consumers' groups are segmented on the basis of demographic variables and their needs, wants, preferences often highly associated with the demographic variables. This demographic variable makes known the updated trends, such as age, sex and income level that brings new strategy to the marketers.

Key words - Demographic variables, behavioral changes, consumer purchase decision.

I. INTRODUCTION

In India, the consumer demographic profile has been changed and developed in terms of media habits. Based on the changing lifestyle and income level, the consumers were considered luxury durable products. According to the Creusen (2010) states that consumer buying decision process was strongly associated with the demographic profile like age, gender, education, income, generation, and family size, marital, life cycle of the family, religion, nationality and social class. The marketer focused demographic variables for segmenting the consumer groups and they are interested in the size and growth rate of population in different states, cities, and nations. Based on this information, the manufacturer formulated their marketing techniques and strategies for fulfilling the consumer desire, wants and preference for the product. It is quite necessary for the manufacturer of durable products to know the behaviour of the consumers. They decided to increase their sales and capture the maximum share of the market.

Consumer behaviour is a process of the consumer uses to make purchase decisions and they tend to react as well as they behave when purchasing the advertised products that they like. It also includes the analysis of factors which influenced the purchase decisions of the product. This behaviour not only covers the purchase decisions but also includes the learning experiences associated with consuming the product or services. The manufacturers combined demographic, social and psychological factors for determining the buying behaviour of the consumers. This dimensions covered two aspects like consumer lifestyle and the way how people live. Evans and Berman (1984) stated that the demographic profile has a strong influence on the consumer's lifestyle and this information helps to determine the consumer motives and behaviour using psychological dimensions. Consumer durable goods refer to various items used in a household kitchen to reduce work content and to make household activities fast, neat and enjoyable. In the present day, the consumer used a large number of durable products like Refrigerator, Television, Washing machine, Air conditioners, audio, and video players to make life more smooth and enjoyable way.

II. REVIEW OF LITERATURE

Imran Shahid and Mubbasher Hassan Syed (2011) This thesis concluded that the demographic characteristics like gender, age, income, education, and area played a significant role in influencing the Swedish consumers to take the purchase decisions of the products. The demographic characteristics have a major impact on the purchasing decision of the consumers. Robert (1999), based on demographic characteristics such as age, gender, area, and education have a strong impact on consumer buying behaviour towards the product. Dahiya Richa (2012), this study revealed that the gender factor has a strong impact on the frequency of online shopping behaviour and the size of the family would affect the online shopping patterns of the consumer. Rakesh Kumar (2014), this research article stated that the producers focused on the demographic factors for maximising the value of the firm's share. As the change in these factors, the consumer attitudinal behaviour also changed according to the market conditions.

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IMPACT OF ADVERTISEMENT ON THE PURCHASE DECISION OF DURABLE PRODUCTS IN CHENNAI CITY

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Abstract

The outcome of an advertisement can be classified into two important domains namely positive and negative effect and persuasion effect .The positive effects are knowledge process involved in the experience of the product as well as transparency about the marketing strategies of marketers in the durable products arena. The persuasion effects of advertisement are mainly originated from the negative experience of the product purchase after watching advertisement. In this paper, the researcher proposed to supply empirical evidences for the determination of both negative and positive effect on consumers' behavioural approach. The study depends upon primary data obtained from the durable consumers in the metropolitan city of Chennai. The researcher adopted convenience sampling method to obtain more than 200 responses to validate the present research. Confirmatory Factor Analysis and Linear Multivariate Analysis together with structural equation model are exploited to successfully supply the empirical evidences. The research concludes that most of the advertisements for the durable products are able to persuade the customers through the updated technology included in the product attributes at cheap price.

Key words: Learning process, Behavioural approach and Durable products.

Introduction

In India, a traditional, modern and creative advertising strategy plays an important role to improve the sales volume of a product, creating awareness and also shaping the attitude of the consumer. Advertising has been viewed as to update, retell and convince among consumers about their product and services. In the world of business, the uppermost concern of advertisers is that of making their product/brand advertisements effectively. Marketing research provides valuable information to the advertiser regarding consumer needs, wants, preferences and demand. According to Wells (2003) suggested that the effective advertisement was based on two dimensions. First, they should satisfy consumer's objectives by engaging them and delivering appropriate messages. Secondly, the advertisements must attain the advertiser's objectives. This author further expanded on the factors related to advertising effectiveness like perception, learning process, and persuasion.

Learning process includes changes in consumer behaviour arising out of their shopping experiences. This process would help the consumer to guide and directly motivated towards the product. According to Solomon (2004), in advertising the learning process has divided into two dimensions such as cognitive learning and classical conditioning. Cognitive learning implies the consumers should know something about the advertised product through reading, watching and hearing the messages. Conditioned learning is

INFLUENCE OF CONSUMER BUYING BEHAVIOR TOWARDS E – RETAILING

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Abstract

The phenomenal growth in the retail sector has given a rise to the business revolution. This revolution focuses businesses to move towards E- retailing. So, therefore understanding the consumer's behavior is necessity for the e- retailers to attract and target the potential customers. This study mainly emphases on influence of consumer buying behavior towards E- tailing. It is based on primary data which is collected from 150 consumers through questionnaire. Collected data's were analyzed with various statistical tools such as percentage, Chi – Square and ANOVA were used to know the influence of consumer buying behavior towards E- retailing.

Keywords: Consumer buying behavior, E- retailing, Retailers.

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A Study on Consumer Satisfaction Towards E- Retailing

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ABSTRACT

E-commerce has been realized more and more important in creating new pattern of the traditional way of people shopping. Retailers should understand the shopper needs and built the foundation of an integrated and personalized experience of the consumer to satisfy and retain them. So, therefore retailers should comprehend the expectation of consumer for earning the revenue and for facing the challenges in the market. The study was conducted among under respondent through questionnaire over internet. This study were analysed with statistical tools like Percentage, Chi-Square and ANOVA to know the satisfaction level of consumer towards E- retailing.

KEY WORDS: E-Retailing, Consumer Satisfaction, E-Retailer.

INTRODUCTION

E-Commerce plays a vital role in the economic development of country. Advancement in the technology of networking, multimedia, data processing, electronic commerce has increased the strong competition amongst the retailers and created new business opportunities for e- retailers. Retailers are spending their time and money in building new Internet business models to meet the expectation of the consumers through various channels to earn revenues. E- Retailing at the same time offers specific benefits to their customers. Online shopping is a convenient way of shopping and consumers have more choice. They can interact with others; exchange their ideas and views through online communities. It is believed that E- retailing is relatively new medium for the communication and the exchange of information which leads to customer's retention. So, therefore Retailers should understand the shopper needs and built the foundation of an

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Studies in Indian Place Names

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Validity of Factors Determining Consumer Attitude towards Durable Products in Chennai

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ABSTRACT

Attitude is an individual's internal assessment of an object such as a branded product and has been a vital concept in marketing research since the 1960s. The marketer has closely noted the consumer attitude towards their products in the market. Advertisements are a strategic role in approaching consumers and influence their purchase decision. The marketer needs to measure the factors to determine the attitude of the consumers towards durable products. Consumer durables consist of any type of product purchased by consumers that are manufactured for long-term use. In this paper, the researcher projected to show empirical evidence for the validation of factors that determines the consumer attitude towards marketable products in Chennai city. This research is based on the primary data attained from the durable consumers in Chennai city. This research is based on the convenience sampling method to obtain 300 responses to validate the research. Confirmatory factor analysis using the AMOS tool successfully supplies empirical evidence. This study concludes that the group of consumers is strongly influenced by the advertisement and some of them felt that the advertisements give irritation feelings.

Keywords: Attitude, Durable, and Marketing Research.

INTRODUCTION

In social psychology, consumer attitude was recognized as one of the main psychological experiences. Over the centuries, the significance of attitude has gradually increased and its technique has developed a lot. The study of consumer attitude plays a very important role in an individual's behaviour. It is assumed that the attitude concept is gaining importance because it's influencing over social behaviour. According to Katz D (2006) defines– "attitude is the predisposition of the individual to evaluate some symbol or aspect of his work favourably or unfavourably."[1] From a consumer behaviour point of view, an attitude is a

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TOXICITY STUDY OF THE ETHANOLIC EXTRACT OF *Moringa concanensis* NIMMO LEAVES IN WISTAR RATS

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ABSTRACT

Moringa concanensis Nimmo plant leaves are widely used in traditional medicine throughout India for the treatment of various ailments including menstrual pain, high blood pressure, jaundice, constipation, skin tumour, cholesterol, and diabetes. There is no literature survey of the toxicity evaluation of the ethanolic extract of *Moringa concanensis* Nimmo leaves. Therefore, the objective of this study was to evaluate the potential toxicity and to check the safety of ethanolic extract *M. concanensis* Nimmo, through the method of acute oral administration in Wistar rats. During the experimental period, male Wistar rats were orally treated with the ethanolic extract of *M. concanensis* Nimmo at the doses of 100, 250, 500, 1000 and 2000 mg/kg and observed thereafter, for a total of 14 days. Every day the general behavior of the rats was noted during the experimental period. Body weight, haematological analysis and histopathological examination were carried out at the end of the experiment period. During the acute toxicity study, no sign of mortality was observed when rats were administered dose of 100, 250, 500, 1000 and 2000 mg/kg ($P<0.05$). Similarly, there were no significant changes in body weight, food consumption, hematology, gross necropsy and histopathological examinations. The results of the current study explored that the treatment with this plant extract for 14 days did not produce significant toxicity. Therefore, our study suggests that the use of appropriate level of *M. concanensis* Nimmo extract as traditional medicine should have a wide range of safety for its therapeutic use.

KEYWORDS: ***Moringa concanensis Nimmo, acute toxicity, safety, body weight, histopathology.***

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Moringa concanensis Nimmo ameliorates hyperglycemia in 3T3-L1 adipocytes by upregulating PPAR-γ, C/EBP-α via Akt signaling pathway and STZ-induced diabetic rats

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ABSTRACT

Moringa concanensis Nimmo is a medicinal plant for treating various human illnesses including menstrual pain, high blood pressure, jaundice, inflammation, pain, fever, sore eyes, and cholesterol in Indian folk medicine. Despite its versatility, its antihyperglycemic mechanism of action (*in vitro* and *in vivo*) remains unclear. Therefore, in this study we developed the possible antihyperglycemic mechanism of action in 3T3-L1 cells by evaluating mRNA and protein expression, which are associated with adipogenesis and lipogenesis (insulin sensitizer). Also, the antihyperglycemic activity of the ethanolic extract of *M. concanensis* Nimmo leaves (EEMCN) was evaluated on glucose, insulin, biochemical, and lipid profile in experimental diabetic rat models induced with streptozotocin (STZ). Results showed that EEMCN leaves enhanced lipid accumulation in 3T3-L1 cells, as assessed by Oil Red O staining, and upregulated gene expression level of PPAR-γ, C/EBP-α, t-SREBP, FAS, Glut-4, adipogenin, DAG, and LPL through Akt signaling in 3T3-L1 cells. Also, EEMCN treatment increased body weight and insulin level and lowered blood glucose, HbA1c, amylase, and lipid profile level in STZ-induced diabetic rats. In conclusion, EEMCN possesses *in vivo* antidiabetic potential, having such efficacy through a mechanism of action that involves antihyperglycemic, hypoglycemic, and potential insulin sensitizer (PPAR-γ, C/EBP-α/Akt over expression) action.

1. Introduction

Diabetes mellitus, commonly known as a group of chronic metabolic disorders, is a public health issue whose prevalence worldwide has been on the rise. It is characterized by hyperglycemia with unusual carbohydrate, fat, and protein metabolism resulting from defective pancreatic β-cells or insulin deficiency/action. This chronic hyperglycemic circumstance of diabetes is associated with long-term damage, dysfunction, and organ failure, particularly the nerves, eyes, blood vessels, heart, and kidney [1]. The total type 2 diabetes population in developed and developing countries has increased from 285 million to 387 million in 2010–2014, because of their lifestyle, age, obesity, and food habits [2]. Diabetes is also associated with an increase in lifestyle diseases including stroke, ischemic heart and hypertensive disease, kidney failure, and blindness. Several approaches are available to control diabetes mellitus, including dietary intervention, aerobic exercise, insulin injection, and a wide array of hypoglycemic drugs (troglitazone (TRZ), metformin, and sulphonylureas). However, long-term conventional synthetic drug treatment is expensive, hardly accessible to people, and may also cause severe side effects; therefore, herbal pharmacotherapy has expanded globally, becoming more readily available affordable to people [3]. Recently, researchers have been paying more attention on the development of antidiabetic drugs from plant sources used in traditional medicine systems. Because of conventional medicine, natural products can prove to be a better treatment than currently used molecules responsible for the severe ambiguous side effects of diabetes [4].

Moringa concanensis (*M. concanensis*) Nimmo is an Indian medicinal plant belonging to the Moringaceae family, growing in various locations including India as well as Asian and Arab countries. Tribal

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Original Article

EVALUATION OF FREE RADICAL SCREENING AND ANTIOXIDANT POTENTIAL OF *MORINGA CONCANENSIS* NIMMO-A MEDICINAL PLANT USED IN INDIAN TRADITIONAL MEDICATION SYSTEM

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ABSTRACT

Objective: We aimed to investigate the free radical scavenging, antioxidant and hepatoprotective potential of *M. concanensis* Nimmo leaves.

Methods: Free radical scavenging activity was evaluated by employing various accepted *in vitro* systems, such as 2,2-diphenyl-1-picrylhydrazyl (DPPH), 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid) (ABTS), hydroxyl (OH) and nitric oxide (NO) radical. Antioxidant potential of *M. concanensis* Nimmo extract was assessed against H_2O_2 in goat liver by determination of superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GPx), glutathione S-transferase (GST), glucose-6-phosphatase dehydrogenase (G-6-PDH), total reduced glutathione (GSH), vitamin C, vitamin E activity, and lipid peroxidation (LPO).

Results: Results showed that the amount of plant extract of *M. concanensis* Nimmo required to scavenge 50% of the DPPH radicals was 401.80 µg/ml, ABTS radical was 353.14 µg/ml, OH radical was 433.71 µg/ml and NO radical was 371.24 µg/ml. Also, the pre-treatment of ethanolic extract of *M. concanensis* Nimmo leaves in goat liver showed a significant protection against H_2O_2 induced oxidative stress by retaining of antioxidants of SOD (4.76±0.25), CAT (26.81±0.25), GPx (6.41±0.34), GST (2.31±0.10), G-6-PDH (0.84±0.02), GSH (37.30±1.12), vitamin C (3.01±0.07), vitamin E (14.43±0.45) within normal range.

Conclusion: In conclusion, promising free radical scavenging, the antioxidant activity of *M. concanensis* Nimmo leaves can be able to treat various diseases caused by free radicals.

Keywords: *Moringa concanensis*, Liver, Antioxidants, Free-radicals, Oxidative stress, Alkaloids

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INTRODUCTION

The liver plays an essential role in the metabolism of xenobiotics, catabolism, biochemical process, physicochemical functions of the body like oxidation, reduction, hydroxylation, hydrolysis, etc. Some hepatotoxic agents cause the liver damage is of severe consequences. In recent years, tremendous of scientific advancement in the field of Hepatology [1]. Oxidative stress is causative agents for various ailments include deoxyribonucleic acid (DNA) damage, cancer, and degeneration of cellular membrane leading to diabetes, liver diseases [2]. The production of oxidative stress can be monitored by an antioxidants system which is robust agents scavenge the free radicals and promotes their decomposition and suppresses their mechanism [3]. The model was very carefully designed to simulate *in vivo* intraperitonial exposure of oxidant. This study was prepared based on the recommendation by the fund for the replacement of animals in medical experimentation (FRAME) to diminish the use of live animals in research and to develop a model system that would simulate *in vivo* conditions [4].

M. concanensis Nimmo is one of the Indian medicinal plants belongs to the family of Moringaceae, used to treat various human diseases [5-8], *M. concanensis* Nimmo plant have confirmed anti-inflammatory [7, 9], anticancer [10], analgesic [9], anti-pyretic [7], anti-implantation [11], anti-convulsant [12], anti-microbial anti-fungal [13] and anti-hyperglycemic activity [14]. To the best of our knowledge, *Moringa concanensis* Nimmo leaves extract have not been investigated for phytochemical profiles, free radical scavenging, and *in vivo* simulated *in vitro* antioxidant properties. Therefore, in this study, we collected leaves to study on phytoconstituents, free radicals and antioxidant activity of the plant with the idea to identify new lead compounds for numerous diseases caused by free radicals.

MATERIALS AND METHODS

Collection of plant sample

Fresh leaves of *M. concanensis* Nimmo were collected from Perambalur, Tamil Nadu, India. The specimen sample was authenticated by the Botanical Survey of India (BSI), Tamilnadu Agricultural University, Coimbatore, Tamil Nadu, India. The voucher specimen (No. BSI/SRC/5/23/2016/Tech-151) was filed in the herbarium cabinet.

Chemicals, reagents and drug

Ascorbic acid, vitamin E, rutin, 2,2-diphenyl-1-picrylhydrazyl (DPPH), 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid) (ABTS), and H_2O_2 were acquired from Sigma and Aldrich (St. Louis, MO). All other chemicals and solvents were bought from Merck Chemicals Mumbai, India.

Preparation of plant extract

The leaves, rinsed with normal saline, dried in a shaded area to remove water, and then turned into powder using a blender. Of the powdered leaves, 10g was extracted with 100 ml of ethanol using a soxhlet apparatus and filtered by using Whatman No. 1 filter paper. The filtrate was then dried under reduced pressure and controlled temperature and concentrated. The concentrated extracts were kept in a small tight container at-20 ° C until further analysis.

Antioxidant assay: *in vitro*

DPPH radical scavenging activity

The DPPH radical assay was established according to the method of Makris *et al.* [15]. Various concentrations (100-500 µg/ml) of a leaf extract (4 ml) were added to 1 ml of DPPH methanol solution. The

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HUMAN RESOURCE MANAGEMENT ISSUES IN MICRO, SMALL AND MEDIUM ENTERPRISES IN TAMIL NADU

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ABSTRACT

Modern part thought progressively when contrasted with different areas of the economy. Miniaturized scale, Small and Medium Enterprises (MSMEs) are said to be the soul of any energetic economy and they are known to be the quiet drivers of a country's economy. MSMEs area has performed exceedingly well and empowered our nation to accomplish a wide measure of modern development and give work. Human Resource Management or HRM practices are vital on the grounds that a large portion of the general population spend a larger part of their life at working spot. Number of studies has found that there is no such legitimate practice of HRM in SMEs. Exhibit study concentrates Ambattur Industrial Estates, Chennai specifically [illegible]. It picked by irregular

Throughout the most recent couple of decades there has been a huge development in MSMEs. Considers uncovered that business visionaries try to infer a few focal points by undertaking operations at a littler level as far as adaptability, casualness, maintainability and basic versatility. In most creating nations, Micro, little and medium undertakings (MSMEs) constitute the greater part of the mechanical base and contribute essentially to their fares and in addition to their GDP. HRM is worried with the administration of individuals at work. Individuals at work are the basic fixing in each association. The route in which individuals are enrolled, created and used by the administration to a great extent figured out if the association will accomplish its fundamental destinations and objectives of an association. Without

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EMPLOYEE PERCEPTION TOWARDS HR PRACTICES IN SME'S IN AMBATTUR INDUSTRIAL ESTATE

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ABSTRACT

The Small and Medium Enterprises (SMEs) function as the driving force of development of the global economy. SMEs contribute towards economic advancements including making and growing employment in developing and underdeveloped country and urban ranges and giving adaptability and advancement in the economy. There is a plenty of research and exchange on the part of SMEs in developed nations, yet there is an extent of research to be led by the human Resource administration (HRM) of the SMEs. The ebb and flow paper discuss the view of the employees towards HRM practices followed in the Indian setting. The research paper likewise talks about and distinguishes the centrality of HRM among the SMEs in India with reference taken from Ambattur Industrial Estate. The paper adds to the current literature by proposing another measurement of research range: overseeing HRM among SMEs in India.

KEYWORDS*: *Small, Medium Enterprises, MSME, HRM Practices, Economy & etc

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INTRODUCTION

Global economies have underlined on the mind-boggling part of Small and Medium Enterprises (SME's) for fiscal development and improvement, basically because of the division is a standout amongst the most 'dynamic'. Small and Medium Enterprises division in India has risen as a very lively and dynamic area. Assessed to utilize more than 1 billion people, this segment gives vast job openings at similarly bring down capital cost when contrasted with extensive enterprises, and aides in the industrialization of pastoral and in urban regions. In this manner diminishes provincial lopsided characteristics, supports decentralization, and guarantees comprehensive development and fair dissemination of national GDP. What's more, the SME's are corresponding and additionally supplementary to substantial enterprises as subordinate units and in this manner; the area contributes immensely to the socio-economic advancement of the nation.

The Report of the Committee on India Vision 2020, Planning Commission of India (2002) avows that worldwide experience affirms that SME's are better protected from the outer stuns, more impervious to the burdens, and more receptive to the requests of the quick changing innovation, globalization, and entrepreneurial advancement.

Small and Medium Enterprises are the foundation of the Indian economy, in all circles of improvement viz., practical, Technological, territorial, socio-economical, political and worldwide. The offer of SME's to Total National GDP was around 38% (Exactly 37.54%) in 2012-2013. As indicated by MSME Annual Report 2015-16,

ON CERTAIN CLASSES OF SAKAGUCHI TYPE FUNCTIONS

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Abstract: The objective of the current work is to present certain sufficient conditions for analytic functions to be of Sakaguchi type(as well as Janowski type) using the method of differential subordination as a tool. The various results discussed here would generalize and extend many known results.

Keywords: Analytic functions; Subordination; Sakaguchi type; Janowski class

I. Introduction and Preliminaries: Let H = H (U) denote the class of functions analytic in U. For a positive integer n and a $\in$ C.

Let

$$\mathcal{H}[a,n]=\{f\in\mathcal{H},\ f(z)=a+a_nz^n+a_{n+1}z^{n+1}+\cdots\},$$

with $H_0 = H[0, 1]$.

We define the class of normalized analytic function A_n as

$$\mathcal{A}_n=\{f\in\mathcal{H},\ f(z)=z+a_{n+1}z^{n+1}+a_{n+2}z^{n+2}+\cdots\}$$

with $A_1 = A$.

For the functions $f, g \in$ U, we say that the function $f(z)$ is subordinate to $g(z)$ in U and write $f \prec g$ (or) $f(z) \prec g(z)$, if there exists an analytic function $w(z)$ with $w(0) = 0$ and $|w(z)| < 1$, $(z \in U)$, such that $f(z) = g(w(z))$, $(z \in U)$. In particular, if the function g is univalent in U, then subordination is equivalent to $f(0) = g(0)$ and $f(U) \subset g(U)$.

Let D be the set of analytic functions $q(z)$ injective on U \ $E(q)$, where

$$E(q)=\{\zeta\in\partial U:\lim_{z\to\zeta}q(z)=\infty\}$$

and $q'(\zeta) \neq 0$ for $\zeta \in \partial$ U \ $E(q)$ and let

$$D_a=\{q(z)\in D;\ q(0)=a\}.$$

A function $f \in A_n$ is said to be in $S_\lambda^*(n,\beta,t)$ if

$$\mathrm{Re}\left(\frac{e^{i\lambda}(1-t)zf'(z)}{f(z)-f(tz)}\right)>\beta\cos\lambda,\quad t\in[-1,1),$$

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An application of TODIM for multi criteria decision making under Intuitionistic fuzzy environment

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Abstract
TODIM is a newly developed multi criteria decision making (MCDM) which consider the psychological behavior of the decision makers (DM's). Initially TODIM method is proposed to solve MCDM problems involving crisp numbers alone. In this paper, an extended TODIM method introduced to solve multi criteria decision making problem in a trapezoidal intuitionistic fuzzy environment where weights of both DM's and criteria are not known. First, the classical TODIM was discussed and then from the view of similarity degree, we can obtain the weight of the evaluation value given by the decision maker. The procedure for MCGDM problem with trapezoidal intuitionistic fuzzy numbers is explained. Finally, an example is illustrated to prove the effectiveness of the proposed method.

Key words: TODIM, Multi Criteria Group Decision Making (MCGDM), Intuitionistic Trapezoidal Fuzzy Numbers (ITFN)

1. Introduction

MCDM is widely used to make an optimal choice from alternatives based on several criteria. In real life situation it is impossible to express all the numbers in terms of crisp values. So fuzzy set theory came into existence. Zadeh [9] in 1965 introduced the concept of fuzzy sets. Attanssov [1] in 1986 extend the concept of fuzzy set of intuitionistic fuzzy sets. Later Attanssov and Gargov [2] introduced the concept of interval- valued intuitionistic fuzzy set. Zhang and Liu [10] used triangular fuzzy number to denote the membership and the non-membership degree. Also, they proposed the weighted arithmetic averaging operator and the approach to multi criteria group decision making with triangular intuitionistic fuzzy information was developed. Wang [7] gave the concept of intuitionistic trapezoidal fuzzy number and interval valued trapezoidal fuzzy numbers. Wang and Zhang [7] developed Hamming distance of intuitionistic trapezoidal fuzzy numbers, intuitionistic trapezoidal fuzzy weighted arithmetic averaging operator (ITFWAA), and intuitionistic trapezoidal fuzzy weighted geometric averaging operator (ITFWGA).

Several multi criteria decision making methods are proposed so far, one such is TODIM method. It was proposed by Gomes and Lima [3] with discrete data. Later it was extended by Fan et al [4] to the fuzzy environment. Krohling et al [5] presented the extension of TODIM to the interval valued intuitionistic fuzzy environment. Due to some complexity and the uncertainty, it is impossible to consider all the aspects of the problem. Therefore, the DM's provide us their knowledge and preference. It may be a bias one. In order to overcome this, a specific and considerable weight must be assigned to each DM's. Also, however, in a fuzzy environment, time, pressure, lack of data and limited information

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On Graph Coding through Pair Labeling

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Abstract

In 2005, J.Baskar Babujee introduced a new type of coding system using graph labeling. In this paper we extend this work to encode twin numbers using the techniques of Number theory and Pair labeling.

AMS Subject Classification: 05C78
Key Words: prime numbers, labeled graphs, pair labeling, graph coding.

1. Introduction

The concept of graph labeling was introduced by Rosa in 1967[4]. A graph labeling is an assignment of integers to the vertices or edges or both subject to certain conditions. Labeled graphs serve as useful models for a broad range of applications such as coding theory, x-ray crystallography, radar astronomy, circuit design, communication network addressing and database management. Detail survey of graph labeling can be seen in A dynamic survey of graph labeling by J.A. Gallian [3].

In [1] J. Baskar Babujee has introduced a new type of coding system called the graph coding using labeling techniques and number theory techniques. In [2] J. Baskar Babujee and S. Babitha has introduced pair labeling in graphs to encrypt and decrypt numbers using Number Theory technique in complete graph k_9. In this paper we extend this work to encode twin numbers using the techniques of Number

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Production, characterization and emulsifying property of exopolysaccharide produced by marine isolate of *Pseudomonas fluorescens*

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Abstract

Most of the natural emulsifiers are obtained from pig fat and rarely from oils like palm oil and coconut oil. Hence, an attempt has been made to isolate and identify the bacteria capable of producing exopolysaccharides which can serve as good emulsifier and can be used in the preparation of safe creams and lotions. Pseudomonas fluorescens isolated from the biofilm formed on catamaran was found to synthesize 2.9 mg/ml of exopolysaccharide. Box Behnken Optimization method predicted the maximum EPS production of 2.86 mg/ml with sucrose, yeast extract, calcium chloride and casamino acid concentration of 2.5, 0.35, 0.35 and 0.75 g/l respectively. FTIR analysis of the extracted polymer showed the presence of protein which might have helped in the formation of stable emulsion. HPLC report indicated the presence glucose, fructose, galactose, rhamnose and mannose and NMR analysis confirmed the presence of glucose, galactose and mannose. The GC analysis identified palmitic, myristic and stearic acid in the EPS. The emulsification activity was almost found to be similar in hydrocarbon with fatty acid compared to hydrocarbon without fatty acid. This ability qualifies *P. fluorescens* as a potential candidate for bioremediation processes and the EPS produced as a substitute for synthetic emulsifiers.

Introduction

Microbial polymers are considered as important sources of polymeric materials that have great potential for commercialization. Due to their diversity in structure and unique

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GROWTH MEDIUM OPTIMIZATION FOR CALCITE PRECIPITATION USING RESPONSE SURFACE METHODOLOGY

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Abstract - The nutritional medium that stimulated the production of carbonate using nitrogen cycle metabolic pathways was explored. Different media used for bacterially induced precipitation of calcium carbonate were brought out for the optimization of a nutrient medium and limit the frequency of feeding to meet industrial economic constraints. The ability of cultures to grow and produce without expensive growth factors also should be assessed. The medium optimization uses nutrient consumption as a foundation for medium formulations stoichiometrically. Statistical experimental designs can aid in interpretation of results and help economize the number of experiments required. There are only very few studies related to optimization of the medium for carbonate precipitation. In this study, the maximum calcite producing bacterial strains *Bacillus sp* and *Pseudomonas sp* were selected from previous screening study (Priya, J. N *et al.*, 2017) and compared the results obtained by laboratory experiments with experimental design CCD of Response Surface Methodology.

Keywords - RSM, Optimization, calcite precipitation, nutrient medium

I. INTRODUCTION

There are many studies in biomineralization of prokaryotes (Rivadeneyra, M. A *et al.*, 2010; Kimhauser, K., & Ruling, R. 2012; Anbu, P *et al.*, 2016; Hinduchoolier, S *et al.*, 2016) but less data is available for the medium employed for the calcite precipitation. Only few very studies have been noted in the optimization of the medium (Duan, T., & Zhu, W. K., 2012). The main goal of this study is to optimize the medium for the calcite precipitation. A useful start to medium optimization is to focus on an initial basal medium contains carbohydrates, amino acids, vitamins, minerals, lipids and growth factors that can be evaluated one at a time or in concert. Screening experimental designs are useful for determining which components have significant effects on cell growth, viability, and productivity with these components at low and high concentration ranges (Jeriems, M., & Yang, X., 2005).

Response surface methodology (RSM) proposed an effective statistical method to be applied for defining the individual character of each factor, its antagonistic and opposed effects (Steinberg, D. M., & Bursztyn, D *et al.*, 2010). It is widely used to optimize bacterial growth, enzymatic and chemical reactions. The specific consumption rates can be calculated and the concentrations of each component of the medium adjusted in the formulation to reflected their actual use. The best calcite producing strains such as B7 strain of *Bacillus sp* and P9 of *Pseudomonas sp* for its maximum EPS content and highest enzyme activity of urease and carbonic anhydrase analysed in the previous study (Priya, J. N *et al.*, 2017) were selected to perform optimization study (Gorlach-Lira, K *et al.*, 2010). However, this study describes the central composite design (CCD) of the RSM component used to derive at the achieve maximum concentration of calcite under different parameters of growth such as carbon source glucose, nitrogen source beef extract, calcium acetate, temperature and pH.

II. MATERIALS & METHODS

A. Laboratory method

Calcite precipitating B4 media constitutes of glucose, beef extract, calcium acetate and agar was used for calcite precipitation by the bacterial strains. The selected strains B7 of *Bacillus sp* and P9 of *Pseudomonas sp* were further optimized to achieve maximum concentration of calcite. The five factors influenced in the calcite precipitation that includes carbon source glucose, nitrogen source beef extract,

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