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Managing Editor
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E-MAIL:
sunilkup562@gmail.com

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डॉ. अरविन्द कुमार दीक्षित
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Dr. BHIMRAO AMBEDKAR UNIVERSITY
(Formerly : Agra University)
AGRA - 282 004 (U.P.) India
Tel : (O) + 91-562-2858668
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MESSAGE

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I would like to thank on behalf of entire Editorial Board, our Contributors and Referees for their cooperation and help.

I extend all my good wishes for success of this journal.

(Arvind Kumar Dixit)

Prof. Prabhu N. Saxena
Editor-in-Chief
Agra University Journal of Research-Science
(AUJR-S)

Off 0562-2850175
Resi. 0562-2522034
Mobile,9837068940
E-mail. dr_pnsaxena@yahoo.co.in

Editor-in-Chief

MESSAGE

It is a matter of happiness that Central Library is publishing "Agra University Journal of Research-Science".

My greeting and best wishes are extended to all our Authors, Referees, Readers, Members of Editorial Board and Advisor for making the journal of world standard.

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I shall welcome the valuable suggestions given by the Editorial Board Members for improvement in the quality of the Journal.

(Prof. P. N. Saxena)

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AGRA UNIVERSITY JOURNAL OF RESEARCH: SCIENCE

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ANTIMICROBIAL SUSCEPTIBILITY OF STAPHYLOCOCCUS AUREUS AND STAPHYLOCOCCUS XYLOSUS ISOLATED FROM GOATS IN AGRA DISTRICT IN DIFFERENT SEASONS

SUMIT KUMAR SINGH, RUDRAKSHI BATRA, SEEMA BHADAURIA

ABSTRACT : Characterization for the antimicrobial susceptibility of 200 *Staphylococcus aureus* and 50 *Staphylococcus xylosus* isolated from goats was done. Resistance of *S. aureus* was most common to penicillin (30%) and tetracycline (28%); resistance of *S. xylosus* to penicillin was present in 7% tetracycline in 27% of isolates. *S. xylosus* was found to be resistant against trimethoprim/sulfamethoxazole and there was no resistance to amoxicillin/clavulanate, ampicillin/ sulbactam, cephalothin, gentamicin, enrofloxacin, amikacin and chloramphenicol among any isolate. There were important differences in the minimum inhibitory concentrations of tetracycline, erythromycin, chloramphenicol, enrofloxacin, penicillin, clindamycin or ciprofloxacin between various seasons.

INTRODUCTION

Staphylococcus aureus is a gram-positive bacterium. This is commonly found on the skin and mucous membrane of both humans or animals. It is associated with many diseases from less serious skin problems to very serious infections such as pneumonia and bacteremia.

S. aureus or *S. xylosus* are coagulase positive staphylococci frequently implicated in opportunistic infections (Weese and Van, 2010). Food animals and humans causing both community acquired and nosocomial infections are caused by S. aureus. It is one of the most common bacterial pathogens in humans. Economic loss or morbidity in animals are caused by *S. aureus* as it is increasingly recognized in companion animal infections. In poultry, S. aureus causes foot and leg infections and septicemia, S. aureus mastitis is the single largest source of economic loss in dairy cattle for the North India (Erskine, 2001 ; White, Ayers, Maurer, 2003). Variety of infections including dermatitis, septic arthritis, and catheter site infections are reported in horses due to MRSA (Weese, Rousseau, Willey, Archambault, McGeer, Low, 2006; Sung, Lloyd, Lindsay, 2008; Devriese, Nzuambe, Godard, 1985). Various infections like septicemia, abscesses or osteomyelitis are associated with MRSA in pigs (Van, Huijsdens, Tiemersma, 2007 and Taylor, 2006).

Staphylococci are universal or different organisms prevailing in nature. At the time of article, the genus Staphylococcus are there of 38 species (Holt, Krieg, Sneath, Staley, Williams, 1994; Lambert, Cox, Mitchell, Rossello, Mora, Del Cueto, Dodge, Orkand, Cano, 1998). Many S. species have been isolated from various birds and mammals. In caprine host, Staphylococcus species have been recovered from mucous membranes or skin, as well as from goat products such as milk and cheese (Devriese, Schleifer, Adegoke, 1985; Valle, Piriz, de la Fuenta, Vadillo, 1991; Place, Hiestand, Burri, Teuber, 2002). In the course of study to determine the signiûcance and prevalence of bacteria in the respiratory tract of goats with pneumonia from different areas in Agra, a small number of unidentiûed staphylococci were isolated. Preliminary routine investigations demonstrated that they were coagulase-negative and resistant towards antibiotics.

Sumit Kumar Singh
Department of Microbiology,
S.S.S. University, Sehore, Bhopal.
Rudrakshi Batra
Seema Bhadauria
Department of Botany, R.B.S. College, Agra

The first reporte among hospital acquired *S. aureus* strains from humans in 1940s after the introduction of penicillin, betalactamase (penicillinase) production is now comprehesively found among *S. aureus* and *S. xylosus* (Ball, Rubin, Chirino-Trejo, Dowling, 2008). The first generation of enrofloxacin, amoxicillin + clavulanate, clindamycin, trimethoprim + sulfamethoxazole and cephalosporins are normally treated by staphylococcal infections in animals (Woodford, 2005). Emerging resistance in these drugs, particularly among methicillin resistant staphylococci, increases the likelihood of treatment failure and represents a risk to public health.

Resistance to antimicrobials is dimatically, geographically and host variable. At present, it was done to study antimicrobial susceptibility of *S. aureus* and *S. xylosus* isolated from different goats from clinical samples collected in Agra.

Materials and methods :

Bacterial isolates

Clinical isolates of S. aureus (n = 200) from goats, and S. xylosus (n = 50) were be collected from Agra. The isolates were be identify by standard methods: colony Gram stain, morphology or biochemical tests including fermentation of mannitol or production of aceton, hyaluronidase, DNase and coagulase. The following identification isolates were frozen in skim milk at -80°C. Methicillin susceptibility was confirmed by oxacillin disc diffusion testing according to CLSI guidelines, and by screening for the mecA gene (May, 2006).

Antimicrobial susceptibility

The minimum inhibitory concentrations (MIC) of 14 drugs were determined using the agar dilution technique according to CLSI guidelines (CLSI, 2008). spring, rainy and summer sources (n = 200) The selected antimicrobials were used as follows: amoxicillin/clavulanate, clindamycin, trimethoprim/ sulfamethoxazole, erythromycin, ampicillin/sulbactam, cephalothin, gentamicin, ciprofloxacin, enrofloxacin, amikacin, chloramphenicol, rifampin, tetracycline and penicillin. Ciprofloxacin, enrofloxacin, and sulbactam were purchased from the Sigma-Aldrich (Sigma-Aldrich, St. Louis, Missouri, USA). The MICs were interpreted according to the Clinical and Laboratory Standards Institute (CLSI) guidelines (May, 2006, CLSI, 1999). S. aureus MTCC 25923 were included for comparison as positive control. Commercially prepared erythromycin or clindamycin discs were used (Hi Media, Bangalore, India).

Statistical analysis

Statistical analyses were conducted with a commercial software SYSTAT.

Results :

Antimicrobial susceptibility profiles

It was found that the isolated *Staphylococcus aureus* were resistant to antimicrobials between 0 and 4, with a median of 1. Number of antimicrobials to which *S. aureus* isolates were resistant varied significantly in different seasons (P = 0.0001). Summer (P < 0.0001) had significantly more antimicrobial resistance then being different from other seasons. There were no significant differences in the number of antimicrobials to which isolates from other seasons were resistant.

Class and/or Antimicrobial	Range Tested *(ug.mL)*	Resistance breakpoint *(ug/ML)*	All *(n=200)*	Winter *(n=20)*	Spring *(n=140)*	Rainy *(n=20)*	Summer *(n=20)*
Amoxicillin/Clavulanate	2-16	6	0	0	0	0	0
MIC_{50}				2	1	1	2
Amikacin	8-64	64	0	0	0	0	0
MIC_{50}				8	8	8	8
Ampicillin/Sulbactam	4-64	30	0	0	0	0	0
MIC_{50}					5	5	4

Table 1. Percent resistant, MIC_{50} and MIC_{90} of *Staphylococcus aureus* overall and solated from winter,

Cephalothin	4-64	32	0	0	0	0	0
MIC_{50}				4	4	4	4
Chloramphenicol	4-32	32	0	0	0	0	0
MIC_{50}				4	4	4	4
MIC_{90}				8	8	8	8
Ciprofloxacin	0.25-16	4	<1	0	0	5	0
MIC_{50}				0.25	0.25	0.25	0.5
MIC_{90}				0.5	0.5	0.5	0.5
Enrofloxacin	0.25-16	4	<1	0	0	0c	0
MIC_{50}				0.25	0.25	0.25	0.25
MIC_{90}				0.25	0.25	0.5	0.25
Clindamycin	0.25-16	4	8	0	0	4	64b
MIC_{50}				0.25	0.25	0.25	16
Erythromycin	0.25-16	9	7	4d	0	7	68b
MIC_{50}				0.25	0.25	0.25	32
Gentamicin	2-16	16	0	0	0	0	0
MIC_{50}				2	2	2	2
Penicillin	0.06-0.5	0.25	28	21	27	43	100b
MIC_{50}				0.06	0.06	0.06	1
MIC_{90}				1	0.5	1	1
Rifampin	0.5-8	3	1	0	0	0	0
MIC_{50}				0.5	0.5	0.5	0.5
Tetracycline	2-32	16	12	24d	1	10	82b
MIC_{50}				2	2	2	32
MIC_{90}				64	2	2	64
Trimethoprim/ Sulfamethoxazole	19-76	76	0	0	0	0	0
MIC_{50}				19	19	19	19

☞ **The MIC_{90} values were identical to the MIC_{50}.**

b Significantly higher MICs ($P < 0.008$) than winter, spring, rainy and summer isolates.

☞ Significantly higher MICs ($P < 0.008$) than winter and spring isolates.

d Significantly higher MICs ($P < 0.008$) than spring isolates.

No resistance to the aminoglycosides, chloramphenicol, trimethoprim/sulfamethoxazole, rifampin, enrofloxacin, amoxicillin/clavulanate, ampicillin/sulbactam, or cephalothin was observed in S. aureus isolated from any species (Table 1). Significant variations in MIC for a given drug, including chloramphenicol or enrofloxacin to which no isolates were resistant, were seen in different seasons (Table 1).

Among S. xylosus isolates, no resistance to the aminoglycosides, chloramphenicol, rifampin, amoxicillin/clavulanate, ampicillin/sulbactam, cephalothin, or the fluoroquinolones was found (Table 2). Tetracycline resistance was most common (26%), followed by erythromycin (9%), clindamycin (6%), penicillin (5%), and trimethoprim/sulfamethoxazole (4%).

Discussion:

By testing this collection of isolates we aimed to define local, species specific resistance patterns. Resistance to tetracycline, erythromycin, clindamycin, and penicillin was significantly higher among porcine isolates than among isolates from other seasons.

Table 2. Percent resistant, MIC... € and MIC‰ € of canine Staphylococcus xylosus (n = 50)

Class and/or Antimicrobial	Range Tested *(ug.mL)*	Resistance breakpoint *(ug/ML)*	Resistant Strains (%)	MIC_{50}	MIC_{90}
Amoxicillin/Clavulanate	2-16	8	0	2	2
Ampicillin/Sulbactam	4-64	32	0	4	4
Cephalothin	4-64	32	0	4	4
Penicillin	0.06-0.5	0.25	5	0.06	0.12
Ciprofloxacin	0.25-16	4	0	0.25	0.25
Enrofloxacin	0.25-16	4	0	0.25	0.25
Clindamycin	0.25-16	4	6	0.25	0.25
Erythromycin	0.25-16	8	9	0.25	0.25
Amikacin	8-64	32	0	8	8
Gentamicin	2-16	8	0	2	2
Chloramphenicol	4-32	32	0	4	4
Rifampin	0.5-8	4	0	0.5	0.5
Tetracycline	2-32	16	26	1	64
Trimethorim/ Sulfamethoxazole	19-76	76	4	19	19

As already reported, spring mastitis isolates were susceptible to penicillin although penicillins are the most commonly used drugs for mastitis therapy; further research is required to determine the reason for this (19). Consistent with previous reports, low rates of resistance to chloramphenicol, the macrolides, aminoglycosides, and fluoroquinolones were found among winter isolates (White, Ayers, Maurer, 2003). A report documenting the susceptibilities of summer *S. aureus* /found similar rates of resistance as are presented here (De Oliveira, Watts, Salmon, Aarestrup, 2000).

To more sensitively found differences between groups, MICs were compared, as opposed to comparing categorical resistance data. Measuring MICs allows detection of small changes in susceptibility that do not occur around defined resistance breakpoints. Routine MIC determination has clinical and research benefits over disc diffusion testing and allows pharmacokinetic/pharmacodynamic principles to be applied when designing evidence based dosing regimens. For example, low level b-lactam resistance in organisms causing urinary tract infections can be overcome by high urine drug concentrations (Kruth, 2006).

The *S. xylosus* isolates were entirely susceptible to most commonly used antimicrobials in canine practice, including amoxicillin/clavulanate, cephalothin, enrofloxacin, and clindamycin.

A coming study with a larger sample size would be better suited to assess changes in susceptibility between species and seasons. The highly resistant staphylococci often reported in the literature may be indicative of a publication and submission bias towards these organisms. Identification of the offending organism followed by careful inspection of its susceptibility profile, are all elements of rational antimicrobial selection. The dissemination of antimicrobial resistant staphylococci is presenting challenges to both human and animal health professionals. Further studies are required to define the antimicrobial susceptibility profiles of veterinary staphylococci to monitor the emergence and dissemination of resistance.

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MEDIA STANDARDIZATION FOR EXPLANTS ESTABLISHMENT OF DENDROCALAMUS STRICTUS (ROXB.) NEESIN VITRO THROUGH AXILLARY BUDS

POOJA SHARMA, DIVYA PATHAK, TANVEER A. KHAN AND RAJNEESH K. AGNIHOTRI

ABSTRACT

*Dendrocalamusstrictus*of family Poaceaeis a multipurpose bamboo species extensively used in paper industry, in agricultural and other industrial implements and now days in pharmaceutical also. In the present study, an effort has been made to establish the explants of *Dendrocalamusstrictus* Nees using nodal part. After surface sterilization,the axillary buds were inoculated on different mediums (Water agar medium, MS medium and MS+PGRs medium) with 30g/l sucrose and 0.8% agar. The maximum numbers of sprouts (2.5±0.5) from axillary buds of mature plants of *Dendrocalamusstrictus*were found on MS medium supplemented with BAP(4 mg/l). Maximum lengths (2.93±0.75 cm) of the sprouted bud were recorded when supplemented with 4 mg/l BAP. Maximum numbers of bud sprouts/explants (2.93±0.3)were obtained when MS medium supplemented with the combination of BAP4mg/l+NAA1mg/l and the maximum shoot elongations were observed when MS medium was supplemented with KIN 2mg/l+BAP 3mgl.

Keywords;-*Dendrocalamusstrictus,* Poaceae, *in-vitro* propagation, MS medium, Plant hormones

INTRODUCTION

*Dendrocalamusstrictus*Roxb.Nees is popularly known as 'Male bamboo' belongs to the subfamily *Bambusoideae o*ffamilyPoaceae.This species is mainly found in semi dry and dry deciduous forests, or in mixed forests and teak plantations. It grows on hill slopes, ravines and alluvial plains from sea level up to 1,200 m. *D. strictus*prefers a low relative humidity and mean annual temperatures between 20-30°C, but can withstand extreme temperatures (as low as -5°C and as high as +45°C). The main constituents of bamboo culms are cellulose, hemi-cellulose and lignin, which amount to over 90% of the total mass. The minor constituents of bamboo are resins, tannins, waxes and inorganic salts.

D. strictus has bothindustrial and medicinal uses. The pulp is extensively used in paper industries. The culms are used for making shaft, walking sticks, axe handle apart from other agricultural and industrial implements (Reddy, 2006). The leaf decoction of *D. strictus* is used as abortifacient and in combination with *Curcuma longa* powder it is used to treat cold, cough and fever (Kamble, *et. al.* 2010). In addition, leaf powder is a rich source of natural antioxidants (Goyal, *et. al.* 2011) and also possesses cut and wound healing property (Mohapatra, *et. al.* 2008). Though this plant is versatile having multifarious uses, but its production is quiet less as compared to that required to meet the global demand. The main problem that hinders the *in vitro* propagation is the poor explants survival and then seed viability period(Saxena and Dhawan, 1999). Hence, in the present investigation an attempt has been made to standardize the proper medium and its composition for healthy establishment of the explants in the form of axillary nodal part (axillary bud).

Materials and Methods

Plant Material

The disease free, healthy, young nodal explantsof *Dendrocalamusstrictus* were collected from PuraniMandi near TajMahal, TajGanj, Agra and used for *in-vitro* establishment of the explants. Nodes present near the shoot apical meristem was preferred for culture to reduce the possibility of endogenous contamination for proper establishment.

Pooja Sharma, Divya Pathak
Tanveer A. Khan and
Rajneesh K. Agnihotri
Department of Botany, School of Life Science
Dr. Bhimrao Aambedkar University, Agra
email :rk_agnihotri@rediffmail.com

Plant sterilizationandculture condition

About 1-2 cm long nodal explants was excised carefully and washed under running tap water for 20 minutes in order to wash off external dust particles/ contaminants. After that explants were soaked in Tween20 (a neutral detergent) solution (2 mg/l) for 20 minutes while stirred up continuously and rinsed thoroughly with distilled water 2-3 times. Then, the explants were soaked in an aqueous solution containing 1% Bavistin (w/v) for 5 minutes and washed with distilled water 3-4 times to remove any traces of fungicides. After that explants were sterilized with 0.1% streptomycin for 10 minutes and rinsed with distilled water 2-3 times. Then the explants were taken to laminar air flow (LAF) hood under sterile condition. Under LAF, the explants were sterilized with 0.1%aqueous solution of mercuric chloride ($HgCl_2$) for 1minute,and then the explants were removed from the sterilizing solution and rinsed thoroughly for 3-4 times with sterile double distilled water. After this treatment, the explants were again washed with sterile double distilled water for 5 minutes each then immersed in an aqueous solution of 1% sodium hypochlorite (v/v). The treatment was given for 2-3 minutes with continuous shaking and rinsed again with sterilized distilled water 2-3 times. Finally, explants were rinsed in 70% ethanol solution for 1 minute and then quickly removed and washed with double distilled water 3-4 times and inoculated in the medium. pH of the medium was adjusted to 5.8. All the cultures were maintained at 25±1°C in culture room with 16/8 h day/ night cycle (Pathak, *et.al.* 2016).

Media Standardization

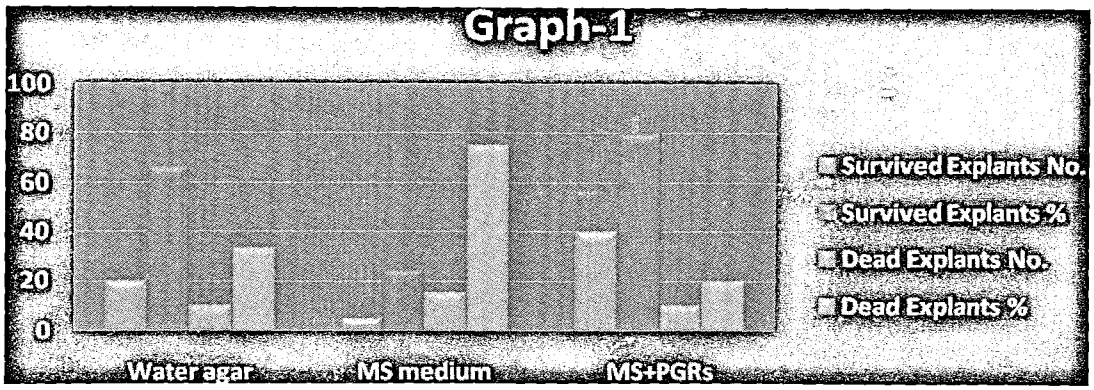
Three types of medium were used to successfully establish the expalnts (axillary buds). These were water agar medium, MS medium and MS medium supplemented with concentrations and combinations of different plant growth regulators (PGRs).

Result and Discussion

In this study, axillary buds of *Dendrocalamusstrictus* were inoculated for *in vitro* establishment of explants (Fig-1.A). The axillary branches were opted since they have active meristem and capable to produce axillary buds which in turn can develop into shoots. Different concentrations of phytohormones (cytokinins and auxins) were used in this study to accelerate shoot bud initiation, multiplication and elongation. Three different media were used in this study; i,e. Water Agar, MS and MS+PGRs. Highest number of explants (40 out of 50) survived with 80% survival rate in MS+PGRs medium. Minimum response (5) was observed on MS medium with 25% survival rate (Table. 1; Graph-1).

Table:1 Survival rate of explants after establishment in different mediums.

Plant species	Medium	No. of explants cultured	Survived Explants		Dead Explants	
			No.	%	No.	%
D. strictus	Water agar	30	20	66.66	10	33.33
	MS medium	20	5	25	15	75
	MS+PGRs	50	40	80	10	20



In vitro axillary bud establishment

To achieve the shoot bud induction from the axillary buds of *Dendrocalamusstrictus,* the axillary buds as explants were cultured on MS medium that contained different concentrations of PGRs. Regeneration of the plantlets was determined by the type of medium used. The explants of *D. strictus*were cultured on MS medium with different concentrations of (BAP 2, 3 and 4 mg/l) and (KIN 1, 2 and 3 mg/l). They were observed regularly for their development by measuring their length in cm and recorded the average number of axillary bud initiation per responded explants. BAP used in MS medium exhibited a marked variation in terms of number of sprouted bud from the nodes of the axillary branches of *D. strictus*.

These sprouted buds started growing after 10-15 days (Fig-1 B) of culture in medium and it was observed that different concentrations of BAP had different impact on bud-break e.g. at 2 mg/l concentration of BAP, only 40% of explants were sprouted within 15 days. Whileat

3 mg/l of BAP, 60% of explants were sprouted after 12 days of inoculation. A further increase in BAP concentration caused an increment in the shoot initiation of bud. It was observed that after increment in the concentration of BAP, 80% shoot induction was recorded at 4 mg/l within 10 days of culture.

Maximum number of shoot buds (2.5±0.5) was recorded on MS medium supplemented with BAP at 4 mg/l, followed by (1.1±0.3) on MS medium supplemented with 3 mg/l BAP. Lowest frequency of shoot bud initiation (0.7±0.45) was recorded at 2 mg/l BAP. KIN was also used for shoot bud induction. KIN showed most effective result of shoot induction 2.3±0.78 in 2mg/l concentration. In 3 mg/l concentration of KIN 1.6±0.8 shoot induction observed. Lower frequency 1.2±0.66 of bud induction was observed in 1 mg/l KIN (Table-2).

Pathak *et al.*(2016) were observed maximum number (92.85%) of shoot induction in MS medium supplemented with different concentrations of BAP and NAA. The result of bud induction experiments clearly demonstrated the positive effect of the presence of BAP alone in medium. Similar observation of BAP was also reported by Goyal*et al.* (2015). Maximum bud-break and multiple shoot formation were observed in 5 mg/l BAP (Kaur*et al.* 2014). According to Jimenez *et al.* (2006) highest bud induction was observed on MS medium with 3 mg/l of BAP. Devi and Sharma (2009) reported that the early bud-break in *Arundinariacallosa*was obtained in 8.9-13.3µM BAP. BAP at lower concentration of 0.5 mg/l in *Clerodendrumserratum*gave best shoot induction and multiplication (Upadhyaya and Koche, 2015).

In vitro axillary bud elongation

After 2 weeks of the growth of shoot buds (Fig-1 C), the healthy shoot buds were excised from initiation media which was treated with different PGRs. For multiple sprouts, MS media supplemented with different concentrations of BAP (2, 3 and 4 mg/l) and NAA (1and 2 mg/l) were used or shoot elongation and shoot buds were transferred to this multiplication medium to achieve maximum multiplication rate. Multiplication started after 3 weeks of sub-culture (Fig-1 D). Growth of multiplication reported after 4 weeks of sub-culture (Fig-1 E) and further multiplication reported after 6 weeks of sub-culture (Fig-1F).

Table: 2 Effect of different concentrations and combination of PGRs on induction and establishment of sprouted buds per culture.

NAA (mg/l)	BAP (mg/l)	Kin (mg/l)	Average no of buds Mean±SD	Lengthof the axillary buds Mean±SD
-	2	-	0.7±0.45	0.45±0.55
-	3	-	1.1±0.3	1.01±0.50
-	4	-	2.5±0.5	2.93±0.75
-	-	1	1.2±0.66	1.8±0.55
-	-	2	2.3±0.78	2.34±0.96
-	-	3	1.6±0.8	2.25±0.71
1.0	2.0		1.1±0.3	1.0±0.75

1.0	4.0	2.9±0.3	1.87±0.95
2.0	3.0	0.7±0.45	0.92±0.70
2.0	3.0	2.3±0.64	3.13±1.38
1.0	2.0	1.5±0.67	1.98±0.95
3.0	1.0	1.1±0.3	2.45±1.06

Maximum shoot elongation (2.3±0.64) was observed in BAP 2mg/l and KIN 3mg/l. Similarly minimum shoot elongation was observed in BAP 3mg/l and KIN 1mg/l (Table-2). It was observed that BAP and NAA in combination had a good effect on bud multiplication. Highest result (2.9±0.3) gave MS medium supplemented with BAP (4 mg/l) and NAA (1 mg/l) and a lowest (0.7±0.45) multiplication rate was observed MS medium with BAP at 3 mg/l and NAA at 2 mg/l (Table 2).

Maximum shoot proliferation was observed 4 shoots per explants on 5+1 mg/l of BAP+NAA within 30 days of inoculation have been reported (Goyal, *et.al.* 2016). Maximum shoot length was 1.41±0.014 cm on 2+1 mg/l of BAP+NAA within 20 days after inoculation.Agnihotri, *et. al.* (2009) reported that a multiplication of about 20 folds was achieved in *Dendrocalamushamiltonii*on MS medium with 8 μM BAP and 1 μM NAA. Vinothkumar, *et al.*(2011) reported that highest multiplication rate in *Wattakakavolubilis*was observed on MS medium containing 0.6 mg/l and 0.2 mg/l NAA. A multiplication of 20 folds was achieved on MS medium supplemented with 8.0μM BAP and 1.0μM NAA (Agnihotri and Nandi, 2009).

Maximum shoot elongation was observed on MS medium supplemented with 3 mg/l KIN (Farhad, *et. al.* 2014). High percentage of shoot bud proliferation (95%) was achieved by culture of nodal explants of *Ficuscarica*on MS medium supplemented with 3.0 mg/l BAP and 0.1 mg/l KIN (Attia, *et al.* 2016).

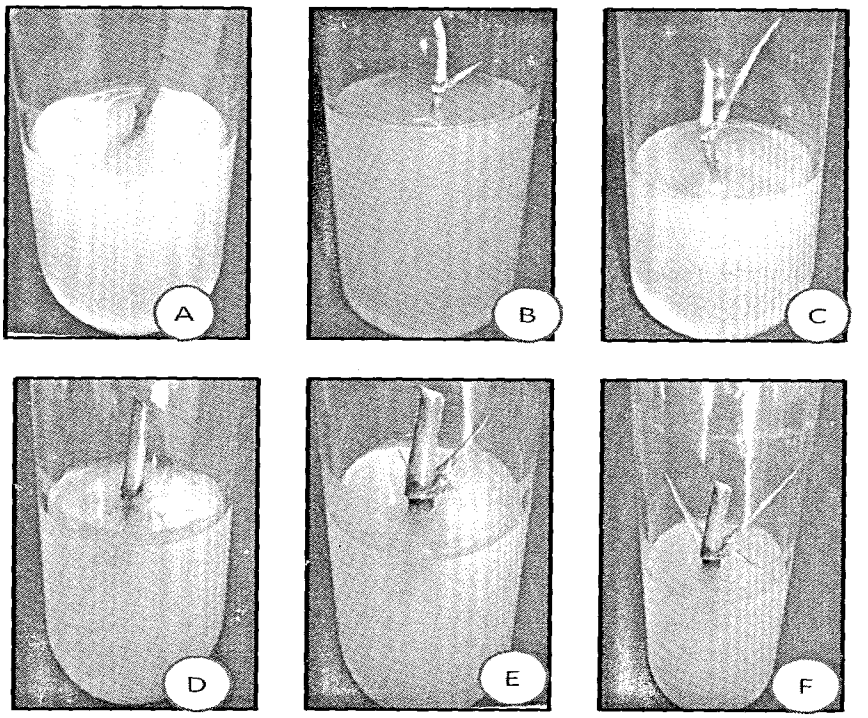


Fig.1. A- First day of inoculation, B- Bud sprouted after 10 days of inoculation, C- Elogation after 2 weeks of inoculation, D- Multiplication started after 3 weeks of sub-culture, E- Growth of multiplication after 4 weeks of sub-culture, F- Highest multiplication observed after 6 weeks of sub-culture.

Conclusion:

Bamboos are giant grasses restricted to Asian tropics and mostly used by the rural people for food, housing and other domestic purposes. The bamboo seeds are viable only for a short period. Propagation through seed is difficult due to unreliable flowering habit at an interval of 30–100 years and quick loss of viability. The conventional vegetative propagation practiced as an alternative method has proved to be only of limited value.Micropropagation is the process of vegetative growth and multiplication from plants tissues or seeds. It is carried out in aseptic and favorable conditions on growth media, using various plant tissue culture techniques and the present study was undertaken to establish a protocol for efficient regeneration of plantlets from explants of one of the economically important bamboos - D. strictus.

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CALL ADMISSION CONTROL SCHEMES FOR HANDOFF CALLS IN WIRELESS COMMUNICATION NETWORK: SURVEY

NIDHI AGARWAL & AMIT SINGHAL

ABSTRACT

The queueing modeling and analysis can play an important role to improve the design and performance of communication system. The proposed channel allocation scheme for cellular network is based on an algorithm to assign optimal number of original channels and guard channels to each cell in the cluster of a cellular radio network depending on the blocking probability of the new and handoff calls.The present paper is motivated by the idea that the proper modeling and analysis can improve the design and performance of queueing system. We present an overview and analysis of communication system. The objective is to highlight the importance and various dimensions of wireless communication system based on cellular architecture.

Keywords:*Overview, Communication network, Channel assignments scheme,Queueing models.*

1. INTRODUCTION

Communication systems are playing an increasingly important role in the military, government, civilian environments, etc.Now-a-days, the strategic and tactical computer communication network is essential in order to facilitate the means of interconnecting them and to provide standard communication protocols which can support a broad range of applications.

Queueing modeling provides a tractable means of obtaining useful performance indices to guide the design and configuration of communication system. There is enormous growth of queueing models dealing with teletraffic problems in different frameworks. One of the key issues in cellular radio system is the channel assignment. Many researchers have addressed the problem of channel assignment schemes for cellular radio networks. It enables the system designers to develop quickly an approximate characterization of the behavior of the communication network under a wide range of traffic loads. It has visualized that as a system gets congested, the service delay in the system increases. A good understanding of blocking and delay is essential for the designing the effective congestion control algorithms. The performance modeling based on queueing theory provides all the tools needed for this analysis. The applications of queueing systems are widely seen in the field of distributed and parallel computing, transmission lines, video on demand (VOD), cloud computing, etc which require high speed communication networks.

To ensure degree of continued transmission in the mobile communication network, one need to address channel assignment, routing and flow control mechanisms. Channel assignment schemes provide optimal allocation of channel to traffic of various types. Depending upon the requirement, different channel assignment schemessuch as fixed, dynamic, adaptive, directed retry are proposed. Routing of traffic is an important feature of traffic management. It involves complex algorithms that support exchange of information. In this paper, the queueing modeling of traffic situations with a viewpoint to minimize the blocking and delay and maximizing the advantages of the communication systems have been studied.

Nidhi Agarwal
Dept. of Computer Science, R.B.S, College, Agra
Amit Singhal
Dept. of Computer Science,
Institute of Engineering & Technology
Dr. Bhimrao Ambedkar University, Agra

The organization of the rest of the paper is as follows. The traffic management for communication networks along with various concepts such as queue management, multimedia requirements, traffic controls and communication dimensions are presented in sections 1. Some perspectives of call admission control (CAC) schemes are discussed in section 2.Section 3 is devoted to the description of some channel reservation schemes. The noble features and future scope of the study carried out are mentioned in section 4.

2. CAC SCHEMES BASED ON SELECTED PARAMETERS

Call admission control (CAC) schemes control the number of users and must be designed to guarantee the QoS requirements for incoming and outgoing calls. New and Handover calls are based on the available resources. It is worthwhile to discuss broad classifications of CAC schemes based on various parameters. Table 1.1 gives a summary of the classifications of CAC.

(A) Based on the type of traffic used in the schemes

Based on the type of traffic used, CAC schemes can be categorized into schemes ealing with homogeneous traffic and schemes dealing with multimedia traffic. A CAC scheme controls the amount of traffic entering the network by either managing the number of call connections into the network. Some notable works related to CAC with different ypes of traffic are reported in table 1.1.

Model	Classes	Key features	References	Strength	Weakness
Traffic Type	Homogeneous	Integrated Voice/ packet transmission	Hong and Rappaport (1986), Sandoval-Arechigaet *al.* (2007), Mahmound and Shen (2011)	Maintains throughput	Increase blocking and dropping probability
	Multimedia	Call admission control policy	Chatziperis *et al.* (2010), Kim *et al.* (2010)	Resource utilization ratio and perform probabilities	New calls suffer an increase in NCBP.
		Heterogeneo us wireless network	El-Kadi *et. al.* (2002), Efthymoglou and Pattaramalai (2009), Alshamrani *et. al.* (2011)	Reduce call dropping probability	High new call blocking probability
Information Type	Local	Congestion problem	Zhang and Fujise (2007), Lu *et al.* (2012)	Enhanced QoS	Wastes resources
	Remote	Mobile multimedia network	Aljadhai and Znati (2001), Gimenez-Guzman *et el.* (2007), Wanalertaket *al.* (2011)	Guarantees Qos for various types of services.	Experiences high new call blocking probability and poor resource utilization
	Local and Remote	Delay, Real time analysis Distributed call admission control	Liang *et al.* (2012) Naghshineh and Schwartz (1996), Gelabert *et al.* (2008)	Prevent starvation of low priority calls Maximizes resource ultilization and and guarantees QoS.	Poor QoS Poor resource ultilization

Table 1.1: Classification of CAC schemes based on various parameters

(B) CAC schemes based on the type of information and number of cells in the admission control

CAC schemes can be classified into local and remote information to determine whether to accept or reject a connection. Calls that are initiated in the cell can be divided into those that complete inside the cell and those that are handed over to other cells. Therefore, a channel could be occupied by the arrival of a new call or a handover, and it could be released either by completion of the call or a handover to another cell.Some researchers have paid their interest towards CAC schemes based on type of information as described in table 1.1.

2.1 CAC schemes based on the type of handoff requests

Call admission schemes can be classified into schemes that prioritize or do not prioritize handoff requests. Prioritized CAC schemes restrict the number of new calls accepted to decrease the CDP. They allocate channels to handoff requests more compared to new calls.

Model	Classes	Key features	References	Strength	Weakness
Handling Mechanism	Nonprioritized	Voice/data integrated service, finite buffer	Hong and Rappaport (1986), Wang and pindzhi Pan (2008)	Achieves a better balance between system utilization and QoS Provisioning	Calls with high blocking probability
		CAC multimedia services	Halgamugeet *al.* (2011)		
	Prioritized	Handoff Prioritization scheme	Bhowmiket *al.* (2011)	Reduces call dropping probability	High new call blocking probability
		Adaptiveslot allocation	Ebersman and Tonguz (1999), Lokeshet *al.* (2010)	Maintains a low call blocking ratio of the ongoing connections of different classes under small number of resources.	Unfair to new calls
Handoff Queueing	Prioritized	Priority reservation scheme, Integrated service	Hong and Rappaport (1989), Sharma and Purohit (2011)	Maximizes resource utilization and guarantees QoS	Higher call dropping probability
		Dynamic reservation scheme, CAC	Hu and Shrma (2004)	Improve resource utilization	Wastes resources

Table 1.2 Classification of CAC schemes based on priority

3. Channel Reservation Schemes

The main idea behind channel reservation schemes is to prioritize handoff calls by exclusively reserving channels for them. In an integrated traffic conditions (voice/data traffic), the priority is given to handoff calls to maintain the GoS, to the ongoing calls instead of new calls. To maintain quality of service (QoS) researchers have developed various schemes to give priority to the handoff voice calls.Table 1.3 summarizes some important channel reservation schemes.

Model	Classes	Key features	References
Channel Reservation	Guard Channel	Call admission control policy (CAC)	Hong and Rappaport (1986), Kim *et al.*(2012)

	Fractional Guard Channel Scheme	Channel reservation Scheme	Cruz-Perez *et al.* (1999), Abdulova and Aybay (2011)
	Subrating	Channel assignment scheme, Handooff strategy	Lin *et al.* (1995), Wu *et al.* (2007), Cheng *et al.* (2009) Jain and Agarwal (2011)
	Buffer Management	Voice/data integrated service	Huang *et al.* (2002), Yavuz and Leung (2007)
		Prioritized delay service	Rivero-Angeles *et al.* (2009), Wang *et al.* (2012)
	Dyanamic Reservation	CAC, Multimedia network	Balachandran *et al.*, (2009), Beevar *et al.*, (2011)

Table 1.3: Classification of channel reservation schemes

3.1 Guard Channel Schemes

Hong and Rappaport (1986) introduced a guard channel scheme dealing with voice calls. In their work, the mobile schemes for call traffic handling were considered as shown in fig. 1.5.

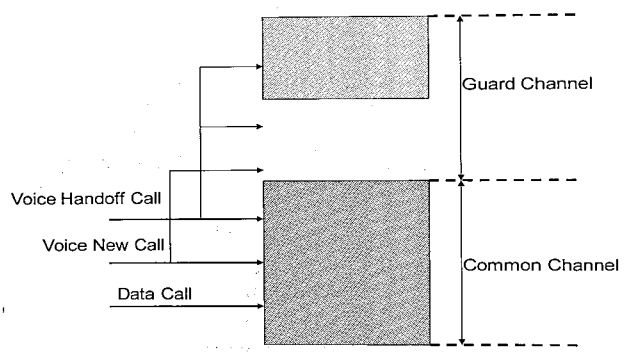

Fig. 1.5: Guard channel reservation based scheme for voice and data services

In the first priority scheme, a fixed number of channels in each cell are reserved exclusively for handoff calls. The second priority scheme employs a similar channel assignment strategy and additionally, the queueing of handoff attempts is allowed. Some other notable contributions on guard channel schemes have been listed in table 1.3.

3.2 Fractional Guard Channel (FGC) Schemes

A different variation of the basic guard channel (GC) scheme is known as fractional guard channel(FGC). In FGC policy, new calls are accepted with a certain probability that depends on the current channel occupancy. Note that both GC and FGC policies accept handoff calls as long as there are some free channels. We summarize the contributions of some prominent researchers in table 1.3.

3.3 Subrating Schemes

In high traffic conditions one of the major bottlenecks is the bandwidth. Many researchers have proposed the subrating scheme whereby the full rate channel is divided into two half rate channels to serve more number of calls (cf. Lin *et al.*,1995). Subrating is usually applied for prioritized calls. The subrating schemes degrade the bandwidth of an existing call in order to accept more handoff calls. In these schemes, some ongoing calls may be forced to operate under a degraded mode in order to accommodate more calls in an overloaded system as depicted in fig. 1.6.

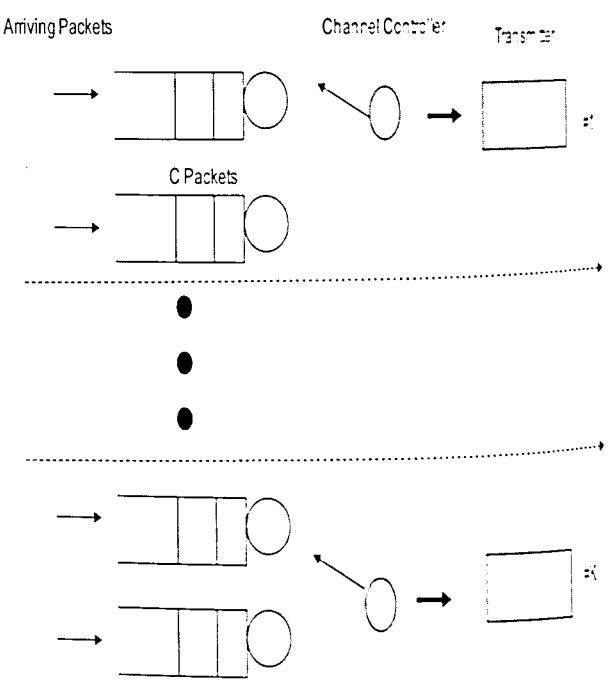

Fig.1.6:Subrating scheme for voice and data services in cellular network

3.4 Buffer Management System

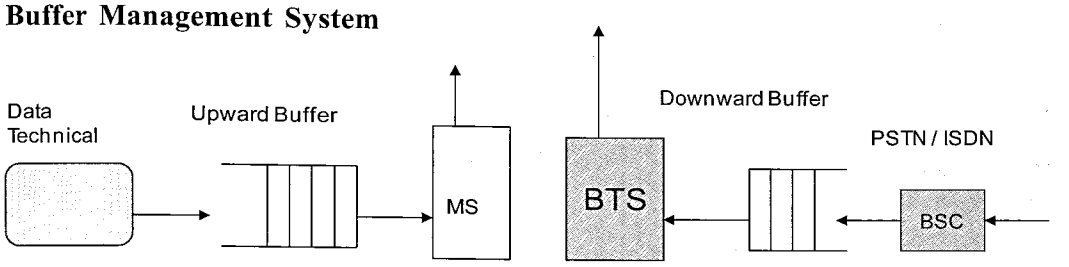

Fig. 1.7: Buffer management scheme for cellular network

Buffer is provided to the calls so that the calls are allowed to wait instead of dropping them in high traffic conditions and once the channels are released, the calls waiting in the buffer are served. Buffer also reduces the blocking probability of the calls. This is an important step forward the threshold strategies that may be employed by network operators. Data traffic is assumed to be delay-tolerant and the capability of buffering the delay-insensitive data traffic is added. It is shown in fig. 1.7.Further the contributions of some prominent researchers are listed in table 1.3.

3.5 Dynamic Reservation Schemes

There are two approaches in dynamic reservation schemes (i) local and (ii) distributed (collaborative) depending on whether they use local information or gather information from neighbors to adjust the reservation threshold. It has been shown that the simple channel scheme performs remarkably well, often better than more complex schemes during periods in which the load does not differ from the expected level.

4. Comparative Analysis

Table 1.1 represents the comparative analysis of the various CAC schemes in terms of traffic type, strength and weaknesses. CAC schemes are classified on the basis of various parameters, type of information and type of handoff requests. Call admission schemes can be classified into prioritized and non-prioritized schemes. These schemes aims at reducing handover call dropping probabilities and new calls blocking probabilities as well as ensuring resource utilization and providing QoS. It reserves extra needed resources at the time of admission to maintain call QoS in case of channel condition change due to mobility.\

5. Conclusion

The rapid growth of communication networks has been witnessed from new services and emerging technologies in the past years. Queueing theory has a vast variety of applications in the field of communication system. This paper is devoted to the queueing modeling and analysis of communication systems as far as congestion problems are concerned. The traffic model for communication networks is not just a theoretical concept rather it is applicable in numerous real time systems. Furthermore, comparative analysis has been provided. The analysis indicates that the majority of the schemes have poor resource utilization because resources are not fully used. The analysis shows new calls experience high call blocking probability due to prioritization used. It is hoped that the present study will provide valuable insights to both queue theorists and communication engineers to improve the existing communication systems.

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A REVIEW ON THE DEVELOPMENT OF MAGNETIC NANOPARTICLES AND THEIR APPLICATIONS

NEETIKA SINGH, HARI MADHAV, GAUTAM JAISWAR

ABSTRACT : Magnetic nanoparticles are one of the most active research areas in advanced materials. MNPs have attracted much interest as a material in the fields of advanced biological, medical and industrial applications such as drug delivery, MRI, hyperthermia, bio separation, fluorescence techniques. In this review, we are discussing different methodologies for the synthesis and characterization of MNPs such as Co-Precipitation, Micro Emulsion, Thermal Decomposition, Solvothermal Routes, LFFSE and Laser Pyrolysis etc., including some recent researches in the field of MNPs. Several different modifications in this field and technologies were discussed such as TEM, SEM, XRD, FTIR etc.

INTRODUCTION

The prefix "nano" has found in many applications to different fields of the knowledge. Nano science, nanotechnology, nanometerials are of the new nano containing terms that occur in scientific reports in popular books, journals, as well as in newspapers. The prefix "nano" comes from the ancient Greek word. The Latin nanus meaning literally dwarf and by extension, very small. The particles which have a size between 1 to 100 nanometres are called nanoparticles whereas size between 101 to 2,500nm and size between 2,500 to 10,000 nm are called Fine particles and coarse particles respectively (Schmid, 2010). Nanoparticles were used in different applications such as modification of properties of polymers (Madhav *et al.*, 2017), in ink (Singh *et al.*, 2017), core-shell (Singh*et al.*, 2016), etc. Magnetic nanoparticles are a class of nanoparticles which can be manipulated using magnetic field gradients. Such particles commonly consists of magnetic elements such as iron, nickel, cobalt and their chemicals compounds. Magnetic materials are those materials that show a response to an applied magnetic field. They are classified into five main types; ferromagnetic, paramagnetic, diamagnetic, antiferromagnetic, and ferromagnetic (Gubin*et al.*, 2005). Magnetic nanoparticles modified with organic molecules have been widely used for biotechnological and biomedical applications, because their properties can be magnetically controlled by applying an external magnetic field. At diameters less than 20 nm, these MNPs are often in a super paramagnetic state at room temperature that is, their magnetization can be saturated under an external magnetic field, but in the absence of this field their net magnetic moments are often randomized to zero by thermal agitation. Owing to their unique magnetic properties and they are of comparable size to biologically important objects, these MNPs are very useful for biomedical applications for e.g., DNA extraction, gene targeting, drug delivery, magnetic resonance imaging, and hyperthermia, etc. (Hao*et al.*, 2010). It was also found that, if MNPs coat with, for example, an antibody, they can be applied for highly sensitive immunoassays or small substance recoveries. Furthermore, single stranded DNA or oligonucleotide immobilized on magnetic particles were successfully used for DNA hybridization analyses, with the aim of identifying organisms and single-nucleotide polymorphism analyses for human blood (Osaka *et al.*,2006).

Neetika Singh, Hari Madhav
Gautam Jaiswar
Department of Chemistry
Institute of Basic Science
Dr. Bhimrao Ambdkar University, Agra
E-mail: gjaiswar@gmail.com

Synthesis of Magnetic Nanoparticles

Now we discuss about the synthesis of magnetic nanoparticles. MNPs have been synthesized with a number of different compositions and phases, including pure metals, Fe, Co and Ni; metal oxides, such as Fe_3O_4 and ^{3}-Fe_2O_3; ferrites, such as MFe_2O_4

(M = Cu, Ni, Mn, Mg, etc.) (Jing *et al.*, 2004; Park *et al.*, 2004) and metal alloys, such as FePt, CoPt (Neveu*et al.*, 2002; Shouheng*et al.*, 2002)

Co-Precipitation

Co-precipitation is a facile and convenient way to synthesize MNPs such as, metal oxides, ferrites from the aqueous salt solution (Iida *et al.*, 2007) and the coating Fe_3O_4/HA was prepared using ammonium hydroxide (Koesnarpadi*et al.*, 2015). Iron oxide nanoparticles (either Fe_3O_4 or ^{3}-Fe_2O_3) and ferrites are usually prepared in an aqueous medium which is shown in following reaction.

$$M^{2+} + 2Fe^{3+} + 8OH^{-} \text{ '! } MFe_2O_4 + 4H_2O$$

Where, M can be Fe^{2+}, Mn^{2+}, Co^{2+}, Cu^{2+}, Mg^{2+}, Zn^{2+} and Ni^{2+}.Complete precipitation should be expected at apH levels between 8 and 14, with a stoichiometric ratio of 2:1 (Fe^{3+}/M^{2+}) in a non-oxidizing oxygen environment (Iida *et al.*, 2007).

Micro Emulsion

The water-in-oil (W/O) micro emulsion has been widely used to synthesize uniform sized MNPs (Pérez*et al.*, 1997; Swadeshmukul *et al.*, 2001). This is an isotropic and thermodynamically stable single-phase system that consists of three components: water, oil and an amphiphilic molecule, called surfactant (Tago*et al.*, 2002). Synthesis of magnetic iron oxide nanoparticle (Patel *et al.*, 2013) and $CoFe_2O_4$ nanoparticles (Liu *et al.*, 2000) by micro emulsion method is reported.

Thermal Decomposition

This method of synthesis involves the chemical decomposition of the substance at elevated temperature. During this method the breaking of the chemical bond takes place. Synthesis of $Mn_{1-x}Co_xFe_2O_4$ nanoparticles (Qingwei*et al.*, 2015) and magnetite nanoparticles (Maity*et al.*, 2009) are reported from this method.

Solvothermal Route

Solvothermal is also called Hydrothermal. In this method, MNPs zeolite (Belviso*et al.*, 2015) and MFe_2O_4 (M ¼ Mn, Co and Ni) nanoparticles (Yánez-Vilar *et al.*, 2009) were prepared by the solvothermal method. These reactions are performed in an aqueous media in reactors or autoclaves, where the pressure can be higher than 2000 psi and temperatures higher than 200°C (Butter *et al.*, 2005; Wang *et al.*, 2009).

Liquid-Feed Flame Pyrolysis

Liquid–feed flame spray pyrolysis (LF-FSP) is one of the most recent iterations in flame spray pyrolysis (FSP) powder production technology (Bickmore*et al.*, 1996). FSP produces metal oxide powders from highly volatile gaseous metal chlorides that are decomposed/ oxidized in hydrogen-oxygen flames to form nano-oxide powders (Strobel *et al.*, 2007; Pratsinis, 1998).

Laser Pyrolysis

Laser light heats a gaseous mixture of iron precursor and a flowing mixture of gases and produce small, narrow sized, non-aggregated NPs. It is used where sensitized $Fe(CO)_5$ mixtures and ethylene, as an energy transfer agent are employed using air, as an oxidant (Tavakoli*et al.*, 2007; Chang *et al.*,1994). Nanoparticles of TiO_2 (Sentein*et al.*, 2009) and Fe_2O_3 (Dumitrache*et al.*, 2015) were synthesized from this method.

Applications

Magnetic nanoparticles play a very important role in modern science such as like drug delivery, MRI, medicine, storage, etc. Some applications of magnetic nanoparticles are shown below

Industrial Applications

Magnetic encapsulates may find very important applications in various branches of high-tech industry, and also in many areas of everyday life. These potential applications include high density magnetic data storage devices, magnetic information storage, xerography, electronics (recording media) (Terris*et al.*, 2005), catalysis (Raed*et al.*, 2006), magnetic inks (for jet printing) (Voit*et al.*, 2003), magnetic refrigeration and their systems etc. Therefore such materials are interesting from both the point of the fundamental study of materials science as well as their applications.

Biological Applications

Two key factors play an important role for *in vivo* applications of these particles: size and surface functionality. Even without targeting surface ligands, super paramagnetic iron oxide NPs (SPIOs) diameters greatly affect *in vivo* bio distribution. Particles with

diameters of 10- 40 nm, including ultra-small SPIOs (USPIOs), are optimal for prolonged blood circulation, they can cross capillary walls, and are often phagocytosed by macrophages which traffic to lymph nodes, and bone marrow (Colombo *et al.*, 2012).

Drug Delivery

Drug targeting has emerged as one of the modern technologies for drug delivery. This technique is use in iron oxide magnetic nanoparticles (IOMNPs). MNPs in combination with an external magnetic field and/or magnetizable implants allow the delivery of particles to the desired target area and fixes them at the local site. Transportation of drugs to a specific site can eliminate side effects and also reduce the dosage required (Dobson, 2006).

Bio Separation

In biomedical research, separation of specific biological entities (e.g., DNAs, proteins, and cells) from their native environment is often required for analysis. Super paramagnetic colloids are ideal for this application, because of their on-off nature of magnetization with and without an external magnetic field, enabling the transportation of biomaterials with a magnetic field. In a typical procedure for separation, the biological entities are labelled by super paramagnetic colloids and then subjected to separation by an external magnetic field (Kang *et al.*, 2009).

Magnetic Resonance Imaging

At the boundary between nanomaterials and medical diagnostics, super paramagnetic iron oxide NPs are proving to be a class of novel probes useful for in vitro and in vivo cellular and molecular imaging. The face-centred cubic packing of oxygen in maghemite/ magnetite, ^{3}-Fe_2O_3/Fe_3O_4, allows electrons to jump between iron ions occupying interstitial tetrahedral and octahedral sites, thus giving the molecules half-metallic properties that are suitable for magnetic resonance imaging (MRI). Super paramagnetic contrast agents have an advantage of producing an enhanced proton relaxation in MRI in comparison with paramagnetic ones. Consequently, less amounts of a SPIO agent is needed to dose the human body than a paramagnetic one. To apply the magnetic fluids to a MRI contrast agent, a SPIO should be dispersed into a biocompatible and biodegradable carrier (Na *et al.*, 2009; Chang *et al.*, 2015).

Hyperthermia

Placing super paramagnetic iron oxide in AC magnetic fields randomly flips the magnetization direction between parallel and antiparallel orientations, allowing the transfer of magnetic energy to the particles in the form of heat, a property that can be used in vivo to increase the temperature of tumour tissues to destroy the pathological cells by hyperthermia. Tumour cells are more sensitive to a temperature increase than healthy ones. Polymer encapsulated Cu–Ni magnetic nanoparticles were used for hyperthermia (Chatterjee *et al.*, 2005).

Conclusion

In this review, the development in magnetic nanoparticles and their applications are described and discussed. In particular, magnetic nanoparticles are of interest not only their peculiar characteristics but also for their possible applications in various fields such as ultra-high-density magnetic recording, magnetic fluids, and biomedical materials. These MNPs also shows catalytic activities, so due to this many researchers have attempted to prepare MNPs with high functionality. MNPs can be prepared by various methods such as Co-Precipitation, Micro Emulsion, Thermal Decomposition, Laser Pyrolysis, etc. In future, functionalized MNPs in form of core-shell, composites or individual particles, etc may be developed for various application such as in information storage, magnetic ink for MICR, medical field, etc.

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SYNTHESIS AND SPECTROPHOTOMETRIC STUDIES OF CHARGE TRANSFER COMPLEX FORMED BETWEEN 6,6'- DIMETHYL-2,22 - BIPYRIDINE AND 2,3,5-TRINITROBENZOIC ACID

NAZIA SIDDIQUI, SHASHI KANT, AKHILESH KUMAR AND SALEEM JAVED

ABSTRACT : Crystals of a novel charge transfer compound of 6,6'-dimethyl-2,22 -bipyridine with 2, 3, 5-trinitrobenzoic acid were isolated andstudied. 6,6'-dimethyl-2,22 -bipyridine used in the reaction belongs to an important class of compounds with broad applicationsin various fields. The proton-transfer (charge transfer) complex was characterized by elemental analysis, FTIR,^{1}HNMR, ESI-mass spectra, and UV–visible analysis. Spectrophotometric studieshave been made in various solvents with different polarities.Spectroscopic studies show formation of 1:1 charge transfer complex between 6,6'-dimethyl-2,22 -bipyridine and 2,3,5-trinitrobenzoic acid.

Keywords:Charge transfer, Spectrophotometric studies, mass spectra, UV–visible analysis, elemental analysis.

INTRODUCTION

The chemistry of charge transfer (CT) complexes is very important among thechemists, biologists and other branch of scientists. Charge transfer complexes act as intermediatesin many reactions including nucleophiles and electron deficient molecules [Salem, 2002; Bazziet al., 2007]. CT complexes play an important role in biologicalsystems like DNA binding, antibacterial, antifungal, insecticide, in iontransfer through lipophilic membranes [Mandal etal., 1999;Gutmannet al., 1992; Brown and Mason 1962; Sondhiet al., 2001; Kidwai, et al., 2004; Dozalet al., 2000; Feng, et al., 1991] and in the study of drugreceptor mechanism [Feng, etal., 1991]. Charge transfer complexes are very important asmaterials for superconductors, solar cells, optical devices and others[Eychmuller and Rogach, 2000; Trotter and White, 1978; Grossel and Weston, 1996; Coleman, et al., 1973; AlQaradawi, et al., 2008; Bqyqkmurat, et al., 1999]. Mulliken [Mulliken, 1952] explained the interactions between donors and À acceptors. Charge transfer transitions involvethe excitation of an electron on the donor to an empty orbital on the acceptor [Zayed, et al., 2005; Mohamedand Zaria, 2008]. CT complex of aromatic nitro compounds with variousaromatic donor compounds has been vastly investigated and explored[KrossandFassel, 1957; Briegleb and Della, 1960;Issa andElessawey, 1973;Hindaweyet al., 1976; Issa, et al., 1984]. Charge transfer complexes formed between aromatic amine(donor) and other aliphatic or aromatic À-acceptors have interest for extensive studies [Tombesi,et al., 1993; Tombesiet al., 1992; Issa,et al., 1991]. N-heterocyclic compounds werealso used as efficient donors in the preparation of charge transfer complexes with different acceptors [Badawy, et al., 1991; Shoukry and Kousini, 1991; Fakhroo, et al., 2010] in recent such years.

The N-heterocyclic compound bipyridine or 1,10-phenanthroline possesses a system of À and n-electrons and has been extensively usedin the synthesis of various coordinate complexes. CT complexes of4,42 -bipyridine with benzoquinone

NaziaSiddiqui
Shashi Kant
Akhilesh Kumar and
Department of Chemistry
Indian Institute of Technology, Kanpur
Saleem Javed
Department of Chemistry,
Institute of Home Science
Dr. Bhimrao Ambedkar University, Agra
*E-mail: saleem.7javed@gmail.com

derivatives are also reported [Obaid, et al., 2012],in which the IR and1H NMR spectroscopic analyses reveal the migrationof a proton from acceptor to donor followed by intermolecular hydrogenbonding in charge transfer interaction [Teleb andGaballa, 2005]. In recent years, synthesis, crystal structures and spectrophotometric studies of proton and electron transfercompounds of3,5-dinitrosalicylic acid with p-phenylenediamine, 2,6-diaminopyridine, o-phenylenediamine and other CT complexes were reported due to their interesting properties [Khanand Ahmad, 2010;Smith, et al., 2003; Khan and Ahmad, 2013, Khan and Ahmad, 2010; Khan, et al., 2011; Khan and Ahmad, 2009;Khan and Ahmad,2010]. However, to the bestof our knowledge, 3,5-dinitrosalicylic acid has not yet been reacted withsuch N-heterocyclic chelator like 2,22 -bipyridine. In thispaper, we report the formation of hydrogen bonded charge transfercomplex due to the proton transfer interaction in reaction of donor6,62 -Dimethyl-2,22 -bipyridine (Byp) with acceptor 2,3,5-Trinitrobenzoic acid (TNBA). Inthe present article, carboxyl proton of TNBA was transferred to bipyridylnitrogen. The charge transfer complex was synthesized and characterized by using FTIR,^{1}H NMR, electron spray ionization(ESI)-MS, UV–visible and spectroscopy.

2. Experimental

2.1. Materials and methods

Analytical grade 6,62 -dimethyl-2,22 -bipyridine (Merck) and TNBA (CDH) werebought for the synthesis of CT complex. Methanol (Merck), ethanol(Merck), DMF (Merck) and acetonitrile (Merck) were used withoutany further purification.

2.2. Procedures

2.2.1. Synthesis of solid CT complex

CT complex was synthesized by mixing saturated methanolicsolution of6,62 -dimethyl-2,22 -bipyridine (0.368 g, 2 mmol) with TNBA (0.514 g,2 mmol). The CT complex is formed at once as yellow needles. FormedCT complex was filtered and washed several times with minimumamount of methanol and dried under vacuum over $CaCl_2$ in desiccator.The results of elemental analysis of CT complex with theoretical values(in bracket) are: $C_{17}H_{12}N_4O_7$ (M.W. 441.35 g, m.p. = 167 °C): C,50.11% (51.71%): H, 3.35% (3.43%): N, 15.61% (15.57%).

2.2.2. Preparation of standard stock solutions

A standard stock solution of 6,62 -dimethyl-2,22 -bipyridine 10^{-2}M (donor) wasprepared by dissolving 0.184 g of4,42 -dimethyl-2,22 -bipyridine in a 100 ml volumetricflask using methanol. Solutions of different concentrations of donor(Byp) (1×10^{-4}M, 1.5×10^{-4}M, 2.0×10^{-4} M, 2.5×10^{-4}M,3.0×10^{-4}M, 1×10^{-3}M, 1.5×10^{-3}M) were prepared in individual volumetric flask by diluting 10^{-2}M solution with the same solvent.Standard methanolic solution of 10^{-2}M TNBA (acceptor) was prepared by dissolving 0.257 g of TNBA in 100 ml volumetric flask usingmethanol. Solution of 1×10^{-4}M TNBA was prepared in 100 ml volumetric flask by diluting 10^{-2}M solution with the same solvent. Severalsolutions were prepared in different solvents by using the sameprocedure.

2.2.3. Single crystal growth

A saturated solution of the synthesized solid (CT complex) was prepared in acetonitrile. The solution was filtered through a Whatman: 41grade filter paper to remove the suspended impurities. The clean filtratewas kept unperturbed in a dust free chamber for seven days. Well defined, yellow colored, transparent and needle shaped crystals weregrown at the end of the seventh day.

2.3. Spectral analyses

FTIR spectra of reactants and the CT complex were recordedemploying spectroscopic 2020 FTIR spectrometer using the KBr disktechnique.

The^{1}H NMR spectrum of CT complex was recorded inCD_3CN using the JEOL-JNM-LA-400 FT (400MHZ) NMR spectrometer.The electronic absorption spectra of the acceptor (TNBA), donor (Byp)and the resulting complex in methanol, ethanol, DMF and acetonitrilewere recorded in the UV region (200–360 nm) using a spectrophotometer SONAR LI-295 UV–visible spectrophotometer with a 1 cm quartzcell path length till 340 nm wavelength and above 340 nm with 1 cmglass cell path length. Donor and acceptor were scanned separatelythrough a spectrophotometric titration [Bhattacharya, et al., 2004] at room temperature totheir wavelength of maximum absorption. When mixing the solutionof acceptor and donor, a charge transfer complex was formed. Thewavelength of maximum absorption of the resulting solution wasdetermined. The complex

of the 1:1 reaction mixture standing overnightat room temperature to form stable complexes, was analyzed. WATERSQ-TOF PREMIER-HAB213 mass spectrometer was used to obtain electronspray ionization (ESI)-mass spectra of novel [(BypH)$^+$(TNBA)$^-$]chargetransfer complex.

3. Results and discussion

3.1. FTIR spectral studies

The protonation can be conveniently followed by infrared spectroscopy [Hindawey,et al., 1980; Issa, et al., 1981]. The study of proton transfer from TNBA to bipyridyl nitrogen has been done by FTIR method. The FTIR spectra of TNBA, bipyridineand resulting CT complex are depicted in Fig. 1. In FTIR spectrum of TNBA a broad band was recorded at 2832–2430cm^{-1}which isrelated to intramolecular hydrogen bonding between COOH and orthosubstituted NO_2 group. The COOH peak appeared at 3448 cm^{-1}whichis absent in the FTIR spectrum of CT complex. In the spectrum of TNBAitself, ½$_s$ (NO_2) vibrations are intense at 1517 and 1315 cm^{-1}.In contrast, in Byp–TNBA (complex), the bands corresponding to ½s (NO_2) vibrations are now observed at 1346 and 1318 cm^{-1}.

The appearance of these two shifted bands in CT complex suggests an increaseof electron density in the nitro groups.The proton vibrations in the intermolecular O^-...H-N^+appear as a broadened band within range 3172-2936 cm^{-1}. This band indicates that hydrogen bond is relatively weak. C-H aromatic band in CT spectrais observed at 3082 cm^{-1}which has appeared at 3172 and 3104 cm^{-1}in spectra of Byp and TNBA respectively. The criterion for CT complexinteraction [Kross and Fassel, 1957] involving the transfer of proton from acceptor to

donor or transfer of an electron from HOMO of the donor to the LUMOof the acceptor is considered by shifting of the CH bands of the donorto higher wave number. The stretching mode of proton attached to a quaternary nitrogen atom [43] is responsible for these types of bands.

Band for C-N (Ring) at 1451 cm^{-1}is shifted to 1441 cm^{-1}in spectrumof CT complex. The charge transfer complex has thus been characterizedeither by absence or shifting to the lower intensities of bands; thisshows an acid–base interaction involving a proton transfer from the acceptor to donor or electron transfer from donor to acceptor which favor a strong hydrogen bonding [Bellamy, 1975]. The disappearance of some peaks for Byp and TNBA in the IR spectra of charge transfer complex is due tothe charge migration

The charge migration from the donor to the acceptor [Salman, et al., 2004; Foster, 1969].

3.2. ^{1}H NMR spectrum studies

^{1}H NMR spectra of CT complexes have been promising tools for detecting proton shifts. In^{1}H NMR

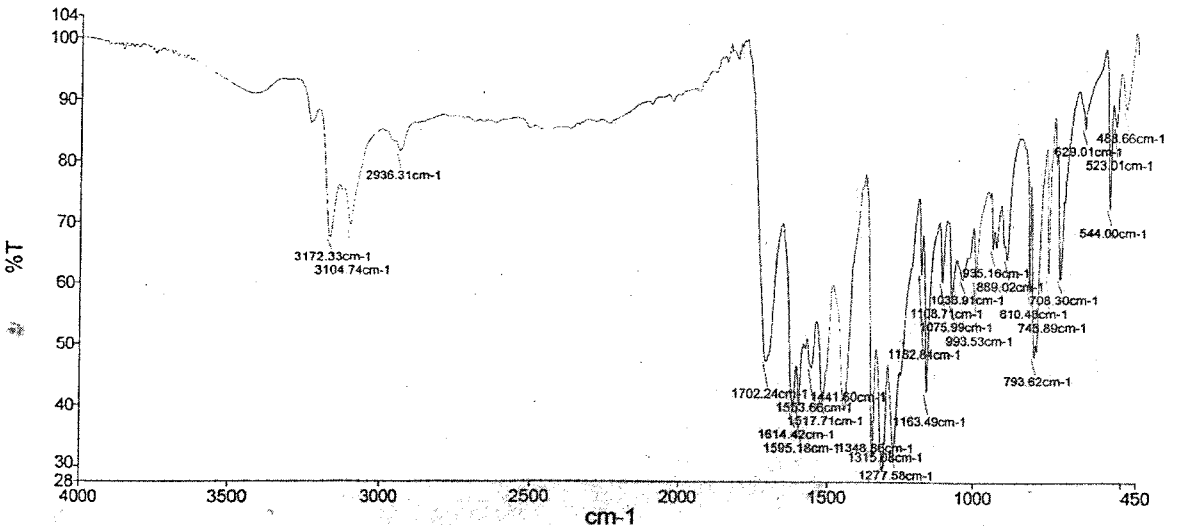

Fig 1: FTIR spectra of (A) Charge transfer complex of 6,62 -dimethyl-2,22 -bipyridine and

spectra of CT complex, signals due toprotons of acceptor are shifted towards up field, while those of donorare shifted towards down field. This behavior is due to increasedshielding of the acceptor protons and a decrease on those of the donorresults from the electron transfer reaction between acceptor anddonor. The^{1}H NMR spectrum of crystal of Byp–TNBA complex isshown in Fig. 2 . The^{1}H NMR spectrum of CT complex displays some changes in comparison to those of their constituents. Inthe spectra of Byp–TNBA, the signal due to the COOH-group of acceptoris no more observed, a new signal for one proton is observed at about′ = 2.1 ppm. This signal is assigned to the new center (=$^+$N-H) formedthrough the transfer of carboxylic proton of TNBA to nitrogen ofbipyridyl ring. A singlets appears at 8.14 and 8.76 ppm for protons of TNBArespectively at some up field shift to the NMR spectra of acceptor.

In the same way protons of bipyridine shows peak at different chemical shift values. All peaks related to bipyridine protons show some down field shift comparison tothe NMR spectra of free bipyridine (donor). These changes give conformation for interaction between donor and acceptor.

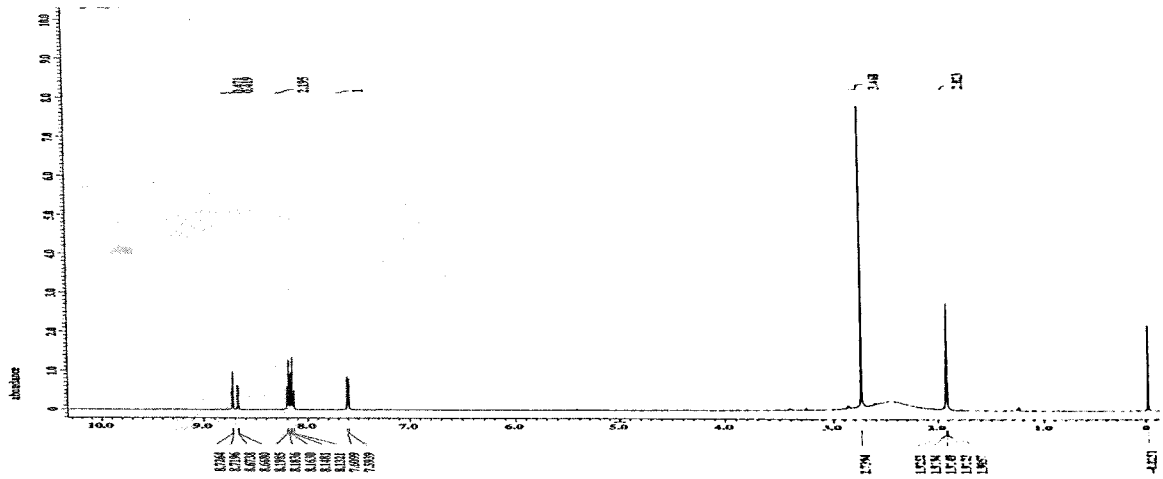

Fig 2: NMR spectra of (A) Charge transfer complex of 6,62 -dimethyl-2,22 -bipyridine and 2,3,5 trinitrobenzoic acid

3.3. Observation of CT electronic spectra

The electronic absorption spectra of 1 × 10^{-4} M solution of thedonor, 6,62 -dimethyl-2,22 -bipyridine (Byp), 1 × 10^{-4}M solution of2,3,5- trinitrobenzoicacid (TNBA) as an acceptor and their 1:1 (donor: acceptor) CT complexrecorded in methanol. As the donor and acceptor solutions were mixed, change in color was observed and a new absorption band appeared in regions where neither donor nor acceptor has any absorption. This is a clear indication of the formation of CT complexof Byp and TNBA and this CT-absorption bandappeared at 232 nm for(Byp)-(TNBA) mixture (CTC).

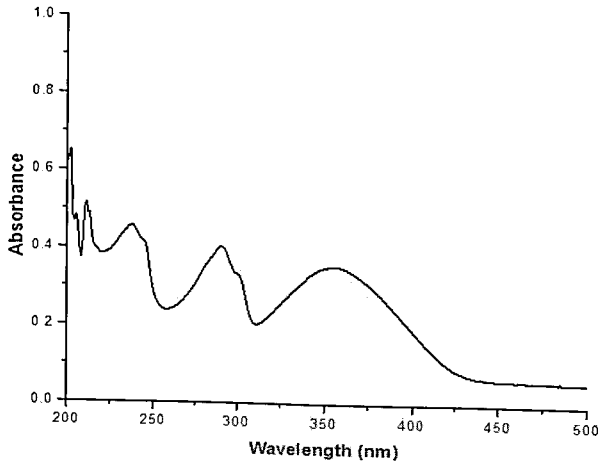

Fig. 3: Showing electronic spectra of CT complex in MeOH

3.4. Mass spectra

ESI mass spectrometry of the CT complex was performed and the datawas studied to confirm the stoichiometry of the reaction. The ESI-massspectrum of the compound shown in Fig. 4 (a) and (b) isarepresentativefragment ion mass spectrum of [(BypH)$^+$(TNBA)$^-$]. The mass spectrumexhibited two intense molecular ion peaks at m/z = 185 and 226assigned to the donor (Byp) and acceptor (TNBA), respectively, which confirm and support the formation

of CT-complex. In addition tothese peaks, the mass spectrum of complex compound shown peak at m/z = 521 which confirm the charge-transfer complex formation with1:1 stoichiometry. The peaks at m/z = 185 and m/z = 226correspond to breach of the bond between the donor (Byp) and acceptor (TNBA), respectively, ascribed to at least two reactants. The ESI-mass datathus corroborates the 1:1 stoichiometry of CT complex.

4. Conclusions

Charge transfer interaction between 6,62 -dimethyl-2,22 -bipyridine as electrondonor, with 2,3,5-trinitrobenzoic acid as the H-donor wasinvestigatedand studied spectrophotometrically in various solvents, viz, ethanol,methanol, acetonitrile and DMF. The study reveals that 1:1 CT complexis formed in all solvents. The spectral analysis indicate À "À* transitionsand N⁺-Hï"O⁻type intermolecular H-bonding between 6,62 -dimethyl-2,22 -bipyridine and 2,3,5-trinitrobenzoic acid. The complex was confirmed on the basis of FTIR,¹H NMR and ESI-mass spectra.

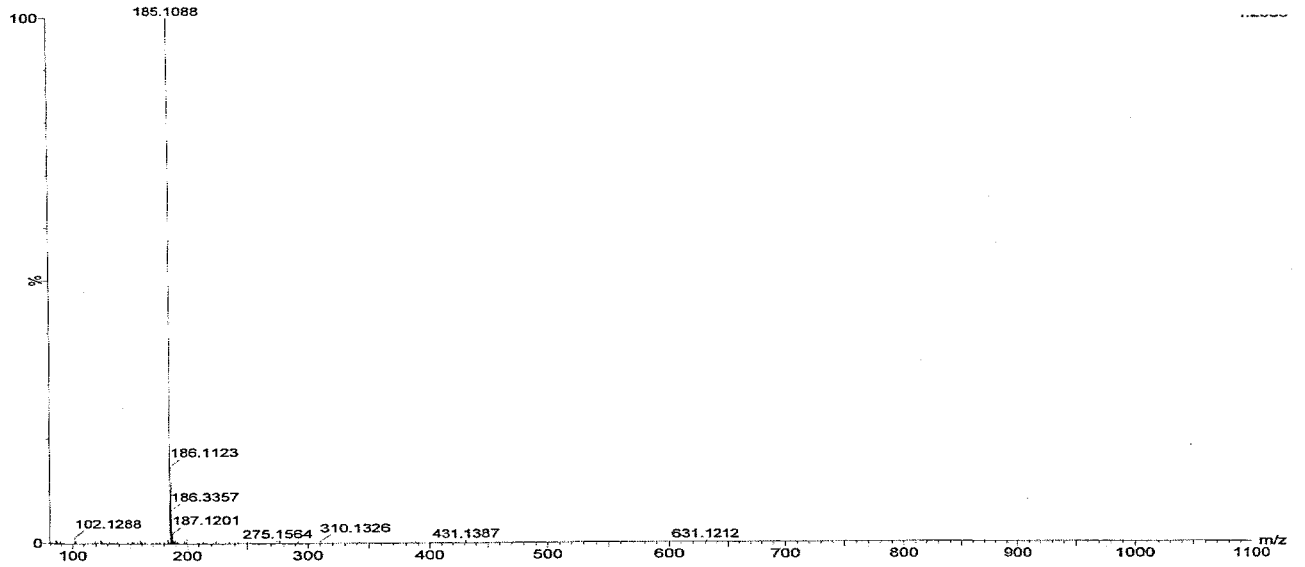

Fig. 4: Mass spectra of CT Complex

Acknowledgments

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A STUDY ON SOCIO-DEMOGRAPHIC PROFILE OF FEMALE LEPROSY PATIENTS IN DISTRICTS OF AGRA AND KANPUR OF UTTAR PRADESH

SHEETAL TOMAR, SUDHIR K. BHATNAGAR, DINESH KR.VERMA

ABSTRACT : To examine the socio-demographic profile in the current integrated set up.200 female leprosy patients ranging from 18-60 years attending Government OPDs were selected by using structured Interview Schedule through purposive Sampling technique.

The result shows that most of the women leprosypatients suffering from leprosy belong to rural area. The proportion of illiterate's women patients was found to be higher and few of them were just literatewho could only write their name. Most of the women patients with leprosy were house-wives and coming from labor's family. It was observed that majority of women patient's family belongs topoorsocio-economic status and most of the families were involved in heavy manual work. Out of the total female leprosy patient's family monthly income was very low. On the other hand 14.5% female patients with leprosy were the head of the family position.

CONCLUSION: In the present study it can be concluded that mostly female patients registered from rural area were illiterate and belong to poor economic status therefore we can say that Illiteracy play aimportant role in elimination of leprosy from the society because due to lack of education they are not able to get good jobs or any business so their socio-economic status becomes low and they cannot adopt healthy life style therefore they come in contact of leprosy. So the present study suggests focusing on education to not also to the patients but also for their children and activities for economic rehabilitation should be undertaken as either gift in cash/ kind to improve their economic status.

SHEETAL TOMAR
S.N. Medical College, Agra
SUDHIR K. BHATNAGAR
Deptt. of Sociology
National P.G. College,
Bhogaon, Mainpuri
DINESH KR.VERMA
SS Educational Institute, Malpura, Agra

INTRODUCTION:

Leprosy a disease as old as mankind has been a public health problem in many developing countries. Though the prevalence rate of leprosy is decreasing in India, it is still a significant health problem. Leprosy seems to have not much impact on the social perceptions of leprosy, which is still looked upon as an undesirable and incurable disease, caused by divine punishment for past sins, Bainson and Borne (1998) (Mutatkar 1979, Hejendra 2000). Social stigma interferes with early reporting and adherence to the treatment. Women in Turkey have many social, cultural and economic problems. in their study found that women with leprosy have problems in common with other women as well as those related to physical and social consequences of leprosy.Caknieret al.(1993). Leprosy is now a disease that can be treated and cured, but it is stigmatized. It is surrounded by myths, by fear, and by isolation. So far as it is more discovered and understood about the conditions, it would appear correspondingly important to engage communities in a process of discussion and education about leprosy John D. et al (2001). Several states in northern India are still lagging behind in elimination of leprosy, and Uttar Pradesh is one of these. With relatively low literacy rates in predominantly in rural areas.

The lower social status of the females may result in great suffering among women patients with leprosy. It is also likely that lower status in itself may contribute to gender differences in the detection and treatment of the disease.Pramila et al. (2006).

Objective of the study:

The study is explored to understand the socio-demographic profile of the female leprosy Patients in the current integrated set up.

Material and methods:

A total of 200 confirmed and registered female leprosy patients from Distt. Hospitals of both the Distt., S.N. Medical college Agra, G. S. V. M. Medical College Kanpur, National JALMA Institute for Leprosy & OMD Agra, four PHCs and two CHCs were selected ranging from age 18-60 years. Data was collected using purposive sampling through structured Interview Schedule, which included questions seeking information on demographic characteristics (Age Economic status, living area, marital status level of education Occupation and status in the family) Statistical analysis was based on the use of the Chi square test for significance.

Sample Coverage

Parameters	Category	District		Grand total	
		Agra	Kanpur	No.	%
INSTITUTE	P.H.C.	16	30	46	23.0
	C.H.C.	3	27	30	15.0
	DistrictHospital	11	4	15	7.5
	MedicalCollege	13	39	52	26.0
	N.J.I.L. & O.M.D.	57	0	57	28.5
TOTAL		100	100	200	100.0

Table-1

Living area	District		Grand total		Statistical Values		
	Agra	Kanpur	No.	%	Ç2	df	p
Rural	68	57	125	62.5			
Urban	28	29	57	28.5	6.54**	2	0.00
Semi- Urban	4	14	18	9.0			
Total	100	100	200	100.0			
: Age in Completed years							
18 – 30	23	25	48	24.0	3.21	3	0.36
30 – 40	29	30	59	29.5			
40 – 50	32	22	54	27.0			
50 – 60	16	23	39	19.5			
Total	100	100	200	100.0			

Table-2

Religion & Caste	District		Grand total		Statistical Values		
	Agra	Kanpur	No.	%	Ç2	df	p
Hindu	68	88	156	78.0	11.66**	1	0.00
Muslim	32	12	44	22.0			
Total	100	100	200	100.0			
General	30	39	69	34.5	3.15	2	0.2
O.B.C.	24	27	51	25.5			
S.C.	46	34	80	40.0			
Total	100	100	200	100.0			

Table -3

Level of Education	District		Grand total		Statistical Values		
	Agra	Kanpur	No.	%	Ç2	df	p
Illiterate	71	54	125	62.5			
Primary	22	32	54	27.0			
High school	5	8	13	6.5	6.86	3	0.07
Intermediate & above	2	6	8	4.0			
Total	100	100	200	100.0			

Table -4

Self Occupation	District		Grand total		Statistical Values		
	Agra	Kanpur	No.	%	Ç2	df	p
Labor/Service	21	8	29	14.5	7.76*	2	0.02
Housewife	57	60	117	58.5			
Unemployed	22	32	54	27.0			
Total	100	100	200	100.0			

Table -5

Family's Monthly Income	District		Grand total		Statistical Values		
	Agra	Kanpur	No.	%	Ç2	df	p
>2000	4	14	18	9.0	9.04*	3	0.02
2001-4000	41	46	87	43.5			
4001-6000	49	33	82	41.0			
6001 & Above	6	7	13	6.5			
Total	100	100	200	100.0			

Table -6

Status in the family	District		Grand total		Statistical Values		
	Agra	Kanpur	No.	%	Ç2	df	p
Head & Earning member	21	8	29	14.5	11.3**	2	0.00
Head but not earning member	6	1	7	3.5			
Member non earning	73	91	164	82.0			
Total	100	100	200	100.0			

Table-1 shows that out of 200 female leprosy patients most of the patients 29.5% (59) were in the age group of 30-40 years while 27% (54) were between the age group of 40-50 years, 24% (48) were in the age group of 18-30 , only 19.5% (39) patients were between the age group of 50-60. Statistically no significant difference was observed in number of female leprosy patients with respect to age in Agra and Kanpur. (Ç2 = 3.21 df = 3, p = 0.36)

Out of the total patients 62.5% (125) belong to rural area while 28.5% (57) from urban and followed by 9.0% (18) were from semi urban. Statistically significant difference was observed in number of leprosy patients with regard to place in Agra and Kanpur district. (Ç2 = 6.54** df = 2, p = 0.00).

As given in Table-2 it was found that 78.0% (156) patients belong to Hindu and 22.0% (44) belong to Islam religion. Statistically there was significant difference seen among female leprosy patients with respect to religion in Agra and Kanpur district. (Ç2 = 11.66** df = 1, p = 0.00)

It was found that 40.0 % (80) of the patients were from Scheduled caste while 34.5% (69) from General caste and 25.5% (51) belong to Other Backward Class. Statistically no significant difference was found in number of female leprosy patients with respect to caste in both the district.(Ç2 = 3.15 df = 2, p = 0.20)

As mentioned in table-3 that majority of the patients 62.5% (125) were illiterate while 27% (54) were up to low level. Only 6.5% (13) of them were High School 4% (8) were Intermediate and above respectively. Statistically there was an insignificant difference in number of female leprosy patients with respect to education in both the district.(Ç2 = 6.86 df = 3, p = 0.076).

As shown in table-4 that out of selected patients 58.5% (117) were housewives while 27.0% (54) patients were unemployed and helping in domestic works sometimes /nor and 14.5% (29) were in job/ laborersStatistically significant difference in number of female leprosy patients with respect to self occupation in Agra and Kanpur district.

(Ç2 = 7.76*df = 2, p = 0.02) was observed.

In table- 5it was found that 43.5% (87) of the respondent's family monthly income was Rs 2001 - 4000 while 41.0% (82) were having Rs 4001-6000 per month 9.0% (18) of them were having family income less than Rs 2000 only 6.5% (13) patient's family monthly income was more than rs 6000. Statistically it was found that there was significant difference in number of female leprosy patients with respect to family monthly income in both the district. (Ç2 = 9.04 df = 3, p = 0.02).

As mentioned in table-6 that most of the female patients 82.0% (164) were non earning in their family while 14.5% (29) were Head and were the earning member only 3.5% (7) were head without earning member in the family. Statistically it has been seen that there was significant difference among female leprosy patients with respect to above the same in Agra and Kanpur district. (Ç2 = 11.3** df = 2, p = 0.00)

Discussion:

Education plays an important role in the matter concerning Health education leads to healthful living and thereby lower incidence of disease. Strong traditions, illiteracy, low status of women, their limited mobility, and poor knowledge of the disease appeared to be important socio cultural factors explaining women under reporting. As compare to similar study

of John and Rao (2009) concluded in their study that majority of the female patients interviewed lying between to 20-50 years. Out of the 200 female leprosy patients most of the patients 29.5% (59) were in the age group of 30-40years while 27% (54) were between the age group of 40-50 years, 24% (48) were in the age group of 18-30, only 19.5% (39) patients were between the age group of 50-60.

It was observed that 62.5% belong to rural area out of the total near about 1/4th of the respondents were just literate who could write their name and the proportion of illiteracy was high. The similar study conducted by R.Teckle et al. (1992) observed a high proportion of illiteracy in the patients.Rao et al. (1996) in their study observed that the proportion of illiteracy 74.3% was high in females and most of them belong to rural area and 64.3% were living in nuclear family Present study shows the socio-economic status was very low and low family monthly income (less than 4000 /-) majority of the patients and their family members were indulged in heavy manual work and few of the families run small scale shop/business for their livelihood. In the similar studies reported by Kant V.P. (1984) and S.S.Naik observed low socio-economic status of the female leprosy patients in their study.

On the other hand Sanjay P et. Al. (2000) observed in their study that most of the female were living below to upper lower economic status.T Cacknier et al (1993) revealed in their study that the educational status of women was very low. 75.6% of the women were illiterate, 64.9% of them married and 39.3% of them were housewives, 50% of them female patient's living standard was lower. Most of the female were living as a member without earning while 14.5% of the patients were head of the family. In the similar study of Rao et al (1996) found that 4.8% of the women were head of the family but in the changing scenario the ratio of the female earning member and hold on the family is increased (14.5%) but all the discussions to their health concern taken by their husband/ in-laws.Maria Ulrich et al.(2002) observed in their study thatsocioeconomic and cultural factors play important roles in the response of women to Mycobacterium leprae and in the impact of leprosy on their lives.Sinha A.K. (2009) observed in their study that 57.1% belonged to poor Socio- economic Status followed by lower-middle (21.6%). Only 12% of respondents belonged to high SES. In the current scenario the present study has resulted in low level of education and low family economic status among the women leprosy patients with no decision making power regarding treatment.

Conclusion:

The present study concluded the low level of education (illiteracy); belong to rural area, family indulged in heavy manual works and low family income. Because of the patients belong to rural area so the degree of educational status was found very low. Being low educational status they are unable to enhance the health seeking behavior and proper source of earning so patient's socio- economic status was found very low in the present study. Finally it was concluded that due to low educational level, disability and stigma is responsible for their lower economic situation. So the study concluded that low level of education, rural residence, female gender and low economic status is somewhere associated with the leprosy.

Recommendations:

Health Education should focus on educating about leprosy in a culturally sensitive way with the specific objectives that will enable them to seek medical help. The paramount issues therefore in education for women are to make it accessible, understandable and non-threatening.

Currently activities for economic rehabilitation should be undertaken as either gift in cash/ kind. Loan for occupation to run any small scale shop and special grants or pension for the patient's livelihood.

Holistic approach should be initiated for the patients who are eligible for support benefit by various aids e.g. hand carts and sewing machine.

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HAIR PATTERN BIOMETRIC DETECTION: A REVIEW

LAW KUMAR SINGH

ABSTRACT : Identification of criminals is an important task in forensic science today. There are many biometric systems available on various biometric traits such as fingerprint, iris, palm, voice, etc. In this paper we review the biometric system that is achieved through a very peculiar trait i.e. hair pattern. Medical research department has confirmed that hair can be used as a proper biometric trait for criminal identification. Therefore it is an important area of research in forensic department.

***IndexTerms*—Biometric trait, hair pattern, criminal identification, forensic.**

I. INTRODUCTION

Thisdocument is prepared by reviewing hair pattern algorithm that was proposed in the paper of Han Su and Adams Wai Kin Kong [2014]. Itaims to explore and review the research paper's biometric system that can correctly identify a person by the help of androgenic hair pattern. There are numerous images where the criminals cover face and neither their fingerprint nor tattoos are exposed. In some cases, certain body parts are exposed such as legs and forearms which consists hair pattern information which can be used as biometric recognition (Terrorist Images [Online]. July 2013). As the medical department has explored that the hair follicles on the human body does not vary once that human reached his/her puberty. Even if hair follicles fall off, the new hair grows right at that particular spot where it has fallen (Stenn and Paus,2001). Therefore it can be used as a stable biometric.

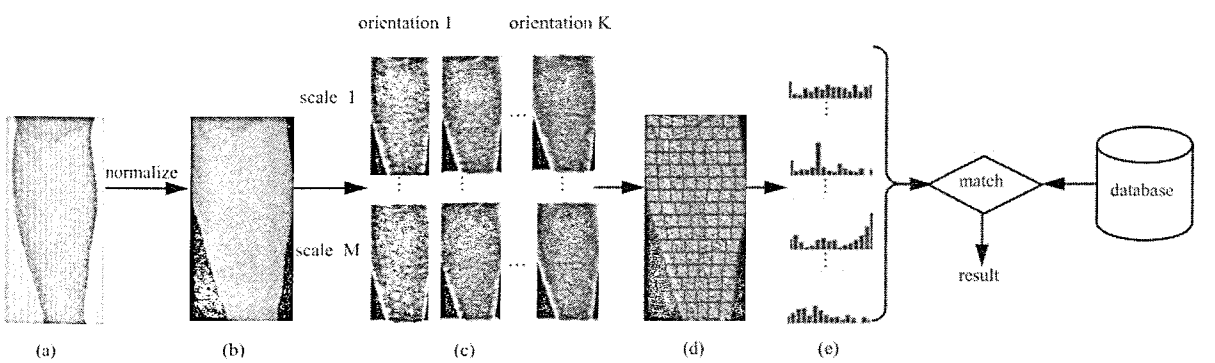

fig. 1 The schematic diagram of the algorithm. (a) Original image. (b) Normalized image. (c) Gabor magnitude. (d) Orientation field. (e) Histograms. [1]

II. The Hair Pattern Algorithm

Thehair pattern algorithm has 3 components, preprocessing, feature extraction, matching as shown in the fig.1. The first component of the algorithm takes color leg image as input and performs different operations on the image to make it suitable image segment that can be passed to next component of the system. The feature extraction part of the algorithm takes the image from the output of the preprocessing stage (i.e. skin pixels image) and apply various filters to extract texture information from the skin image. The last component of the system is

Law Kumar Singh
Department of Computer Science and Engineering
Hindustan College of Science and Technology
Farah, Mathura, Uttar Pradesh
lawkumarcs@gmail.com

matching, where histograms are generated from the texture information and matched with the existing database for identifying known criminals.

A. Preprocessing

As we gather the images from the crime scene, internet, etc. We have the different size, resolution and orientation. Therefore it is necessary to preprocess these images to be able to extract relevant information efficiently. The approach that is used in this algorithm is semi-automatic approach that is composed of manual segmenting, which defines the ROI (i.e. region of interest) and then automatic segmentation and finally manual correction is done. The automatic segmentation utilizes the skin color and leg boundaries as summarized below:

Step 1: The colored cropped image denoted as I, from the manual segmentation is first converted to grayscale image and then smoothed by a two dimensional median filter. This smoothed image is used for edge detection by applying Sobel edge detector to result an image denoted as J.

Step 2: The I is split in 3 channels i.e. RGB more precisely red, green, blue. If the color difference between the red channel pixel and the green channel pixel is within the color range (i.e. 5-80), then that is pixel is retained otherwise that pixel is set to zero. This processed image is denoted as L.

*Step 3:*If a pixel in J is zero and L is not zero, the corresponding pixel in the I is retained considering it as skin pixel. If the pixel in J is equal to one and the neighborhood in L is not zero, the corresponding pixel in the I is retained considering it as skin pixel. Otherwise the pixel is set to zero.

After combining the results a segmented image is obtained. Then finally again manual segmentation is performed to finalize the boundaries with the cropping tool for accurate leg image.The finalized image is resized to 142×298, 106×223, 71×149 and 35×74 pixels. Resizing of the image to these resolutions is to evaluate androgenic hair patterns in low resolution images[1].

B. Feature Extraction

Medical research has proven that androgenic hair densities are stable trait, as different persons have different hair types and so their follicle directions. Therefore to capture this orientation information Gabor Oriented histograms on a dynamic grid system are proposed.

*1) Orientation Field:*The next component of this proposed algorithm utilizes the orientation information of the hair follicle from the hair patch/image. To compute orientation field Gabor filter are used. To capture orientation information real parts of gabor filters are applied to the segmented image, which is defined as

$$G(x,y,\lambda_k,\sigma_m,\gamma) - \frac{\gamma \exp\left(\frac{x'^2+}{2\sigma_m^2}\right)\gamma\cos\left(\frac{}{\sigma_{mk}}\right)^{2\pi}}{2\pi\,\sigma_m 2} \quad (1)$$

in whichx2 = x cos $_k$ + y sin $_k$and y2 = "x sin $_k$ +y cos $_k$, they are the rotated positions with orientation $_k$ = kÀ/16, »$_{mk}$ is the wavelength of the sinusoidal component that is modulated with the Gaussian component in gabor filter, Ã$_m$ is thes.d. (i.e. standard deviation) of the elliptical Gaussian surface along x direction, ^{3} is the spatial aspect ratio of gabormask, m " {1,..., M} (ex. 2,4,5) and k " {1,..., K} (ex. 0,11.5,23....360) are the scale and orientation indexes respectively. To enhance the quality, the DC component in the gabor filters is removed by taking the fourier transform of the mask and making the first element equal to zero and then taking inverse fourier transform of the resulted mask. So if we take 3 scales and 32 orientations then in total 96 gabor mask with zero DC are applied to the segmented image.

Let P be the pre-processed image and G be the real part of Gabor filter with DC component removed. The result of applying filter operation on the preprocessed image is denoted as F.

$$F_{\lambda_{mk}\,\theta_k\,\sigma_m,\gamma}(x,y) = G(x,y,\lambda_{mk},\theta_k,\sigma_m,\gamma) * I(x,y) \quad (2)$$

Since F is real, its magnitude is just its absolute value which is denoted by Mag.

$$Mag\,\lambda_{mk}\,\theta_k,\sigma_m,\gamma\,(x,y) = |F\,\lambda_{mk}\,\theta_k,\sigma_m,\gamma\,(x,y)| \quad (3)$$

Magnitude field denoted as M can be computed by taking maximum value at a particular pixel among all the filtered images at that particular location.

$$M\,\lambda_{mk}\,\theta_k,\sigma_m,\gamma\,(x,y) = max_{m,k}\,Mag_{\lambda_{mk},\theta_k,\sigma_m,\gamma}(x,y) \quad (4)$$

Orientation Field which is denoted as O is the argument maximum (i.e. orientation index k) value of the magnitude field.

$$O(xy) = arg\theta_k \, max_{m,k} Mag_{\lambda_{mk}\ \theta_k\ \sigma_m,\ \gamma\ (x,y)} \quad (5)$$

2) Orientation Field Histograms: To produce Orientation histograms, the segmented image P is divided into rectangular blocks. There are approximately 300 pixels in each block. The image P is divided into E rows and the number of blocks in i^{th}row is calculated by

$$N_{1\_} |= -X^E \frac{+"0.5}{2\ \mu_{is}\ \_} | \quad (6)$$

where i = 1 ,..., E, ¼is is the average number of skin pixels in the ith row, ¼ia is the total number of pixels, includingbackground pixels in the ith row.

In each block, one histogram is computed from the orientation field. Therefore N histograms are obtained. Since the block sizes is different in all the images, the histograms have to be normalized. The bin values in the normalized histograms are between zero and one, also the summation of all bin values is equal to one. Normalized histogram of a block is computed by

$$H_{Obj}(k) = —^1 \sum_{|Bj|\,(x,y)\ \varepsilon\ Bj} \delta(O(x,y) = k) \quad (7)$$

where B_j is a set containing positionof the pixels in the j^{th}block, %B_j% is the total no of pixels of B_j , ′ is the Kronecker delta function which yields value (=k) when x==y and k is anorientation index.These histograms are called Gabor orientation histograms.

C. Matching

This is the last step in which given image and registered image are matched to find the percentage of similarity in the two images. Given two sets of Gabor orientation histograms, $HO_i = \{hO_i B_1, ..., hO_i B_N\}$ and $HO_d = \{hO_d B_1, ..., hO_d B_N\}$, from respectively an input image and a registered image in a database, the blockwise Chi-square distance defined as is used to measure their dissimilarity.

$$X(H_{Oi,}H_{Od}) = \sum\sum \frac{(ho_{iBi}(k) - h_{OdBi}(k)^2}{(ho_{iBi}(k) - h_{OdBi}(k)} \quad (8)$$

III. EXPERIMENTAL RESULTS

As the paper describes the algorithm on androgenic hair patterns in very low resolution images, the authors of the paper[1] experimented and provided with some results. The preprocessed data were first resized to 142 × 298, 106 × 223, 71 × 149 and 35 × 74 pixels and the corresponding sizes were respectively 25, 18.75, 12.5 and 6.25 dpi. Then, they resized these images up back to 142 × 298 pixels so they did not need to change the parameters in the algorithm. The imageswith resolutionsof25 and 18.75 dpi provide same performance.

CONCLUSION

In this paper, we try to review and enhance the already proposed hair pattern algorithm by Han Su and Adams Wai Kin Kong(Su, and Kong,2014). The review is basically done the Hair pattern alogorithm is has its main area of concern on the gabororiented histograms which are produced by the help of gabor mask. Once these hair pattern algorithms are fully functional to produce sufficiently effective results,they can be highly beneficial to forensic department for criminal identification. Therefore we aim to make a robust criminal identification biometric system

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PHOTOPERIOD AND REPRODUCTION PATTERN IN MALE CAT FISH (*Clarias batrachus*)

AMITA SARKAR

ABSTRACT : Reproduction is affected by diurnal and seasonal variations of photoperiod in teleost fishes.Aim of present work was to analyse the synchrony between the photoperiod and reproduction in Cat fish ,*Clarias batrachus*. Results suggest that Photoperiod plays an important role in reproduction of Cat fish.The experiment was conducted in lab by taking up different photoperiods which were arranged by artificial light control. The effect of the photoperiod on reproductive function was assessed by studying gonado somatic index (GSI) and hormone viz, testosterone . The results reveal that there is either reduction or advancement in reproduction in fish by changing their photoperiodic regimes. GSI index was higher in fish under 14hr L / 10 hr D at 26^{0}C regime while it was low in the fish kept in3 hr L / 21 hr D at 26 ^{0}C photoperiod and the hormonal values showed correlation with this.

Key words: reproduction, photoperiod ,GSI, testosterone etc

INTRODUCTION

In all teleost fish, photoperiod acts as an important cue in regulation of reproduction. Studies have been conducted to find out the influences of environmental factors on reproductive activity in fish and effects of photoperiod and temperature of water have been found influential on gonadal development. (de Vlaming,1974; Lam, 1983). The reproductive cycle of many temperate zone fishes are regulated by seasonal changes of day length (De Vlaming, 1974; Akinwande et al., 2011). Seasonal changes in the light pattern or photoperiod constitute one of the major and regular environmental cues, which appear to perform an important role in the regulation of or synchronization with the reproductive cycle in teleost fish species. (de Vlaming,1974). Air-breathing fish are easily maintained in laboratory and respond to the photoperiods applied.(Chaudhuri 1997; Acharia *et al* . 2000; Hoar 1969, Peter, 1981). Aim of present study was to analyse the synchrony between the photoperiod and reproduction in Cat fish,*Clarias batrachus*.

Amita Sarkar
Department of Zoology
Agra College, Agra

Material and Method

Sexually mature fish (*Clariasbatrachus*) were taken up for the experiment.Fish were collected from a commercial dealers and local suppliers.They were acclimatized to the laboratory conditions for five days. The effect of the photoperiod temperature regimes on reproductive function was assessed by GSI and levels of hormone testosterone. The fish were divided in three groups in aquariums. The light period were set by standard time switches. Fishes were exposed to three photoperiod regimes. The Photo regimes taken up for the study were; 3 hr L / 21 hr D at 26 ^{0}C ,6 hr L / 18 hr D at 26^{0}C and 14hr L / 10 hr D at 26^{0}C.

Gonadosomatic index (G.S.I) weight of gonad is expressed as percentage of the total body weight.

$$GSI\ (\%) = \frac{\text{gonadwieght(g)} \times 100}{\text{totalbody weight(g)}}$$

Testosterone (ng/ml)

Fish serum was incubated with the testosterone antibody and the testosterone-horseradish peroxidase conjugate in the anti-mouse IgG coated well. In this solid-phase system, the antibody bound testosterone remained on the well while unbound testosterone was removed by washing. A chemiluminescence reaction developed when the CLIA substrate was mixed with the antibody bound testosterone-horseradish peroxidase enzyme conjugate. The Related Light Unit (RLU) is proportional to the amount of enzyme present

and is inversely related to the amount of unlabeled Test in the sample. By reference to a series of Test standards assayed in the same way, the concentration of Test in the unknown sample is quantified.

Reagents used were, Microplate coated with goat anti-mouse IgG (1 plate, 48wells/96wells), Horseradish peroxidase (HRP) labeled testosterone (Test) in Stabilizing Buffer (1 vial, 3.0ml/6.0 ml), Mouse monoclonal antibodies to Test (anti-Test MAb) in Stabilizing Buffer (1 vial,3.0ml/6 .0ml),Reference Standards: 0, 0.5, 1, 2.5, 10 and 20ng/ml (6 vials, 0.5ml/ea),1 bag of PBS-T Powder was added to 500ml of distilled water and mixed well with magnetic stirrer. The Wash Solution is stable at room temperature for 2 months.

The volume of each well was about 300¼l.25¼l of substrate A and B were dispensed into each well .Incubation at room temperature in the dark for 10 minutes without shaking, then the RLU was plotted.

Statistical Analysis :- Data was analyzed by mean, standard deviation and standard error of mean and ANOVA..

Results and discussion

G.S.I.

Testes was very small and thread like in 3 hr L / 21 hr D photoregime group and the G.S.I. value was 1.19±.01 .In 6 hr L / 18 hr D photo regime, the G.S.I value was 2.02±.05 and testes were poorly developed ,while in 14hr L / 10 hr D at 26^{0}C the G.S.I was 5.90±.30 and testes showed developing stage.

G.S.I. of male in control group was 6.75 ± .27 which is significantly different from

3 hr L / 21 hr D , 6 hr L / 18 hr D and 14hr L / 10 hr D.It is also different from initial body weight (1.12± .021) of Fish at $P < 0.05$.

Testosterone ng/ml

Testosterone level in was0.12±.034 in photo regime, 3 hr L / 21 hr D at 26 ^{0}C.

It was.25±.024, in photo regime 6 hr L / 18 hr D and 1.92±.02 in 14hr L / 10 hr D photo regime at 26^{0}C .

In **control group** Testosterone hormone value of fish in control group was 2.37 ±.08 which is significantly different from 3 hr L / 21 hr D , 6 hr L / 18 hr D and 14hr L / 10 hr D of Fish at $P < 0.01$.

Amongst different environmental factors, photoperiod and temperature are the two most commonly important cues. Sexual maturation of fish is controlled by hormones which turn are regulated principally by photoperiod. Photoperiod and temperature are generally considered the most important factors.

The reproduction periods of fish species usually last only several weeks or even just a couple of days. The specific reproductive and maturational timing of fishes is a result of adaption and evolution. It is critical for the male and female to be ready to breed at the same time and to ensure the young hatch and commence feeding in the right season .(Adebayo, 2006; Akinwande et al., 2011; Chaturvedi and Pandey, 2012).

Present work showed that photoperiod plays an important role in the regulation of the reproductive cycle in *Clariasbatrachus*. To investigatethe involvement of circadian rhythm/photo regime *of lightsensivity* during gonadal and other related functions ,response of fish for different photoperiodic regimes has been studied.

The present study was conducted to find out better environmental conditions of breeding for fish *Clariasbatrachus*in terms of photoperiod and temperature. The results suggests that photoregimes 14hr L / 10 hr D at 26^{0}C is more effective photo regime for breeding of fish than other two experimental regimes.

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EFFECTS OF AL DOPING ON THE MAGNETIZATION OF FE2O3 MAGNETIC NANOPARTICLES: MORPHOLOGY STUDY

AKANKSHA DIXIT, NEETIKA SINGH, REEVA KATHERIA AND GAUTAM JAISWAR

ABSTRACT : Undoped and doped Fe_2O_3 nanoparticles were successfully synthesized by sol-gel method. Doped nanoparticles of Fe_2O_3 were prepared by using Al as a dopant in concentration of 1, 2, 4 and 6 wt% with respect to Fe_2O_3. The effects on the un-doped Fe_2O_3 and Al doped Fe_2O_3 nanoparticles samples were characterised by using Vibrating sample magnetometer (VSM) to find the magnetism. Transmission electron microscopy (TEM) to see morphology, size, shape andFourier- transform infrared spectroscopy (FTIR) structures. The result shows that VSM the saturation magnetization (Ms) of the particles were measured at room temperature. i.e magnetism ofun-doped $Fe_2O_3$and Al doped Fe_2O_3 is 13.53 emu/g and 7.83 emu/g. TEM images of the nanoparticles reveals the highly crystalline nature of un-doped $Fe_2O_3$and Al doped Fe_2O_3. The presence of functional groups were analysed by FTIR spectra.

Keywords: Fe_2O_3,Al, Sol-gel method, VSM, TEM.

INTRODUCTION

Magnetic nanoparticles are a class of engineered nanoparticle which can be manipulated by an external magnetic field.Magnetic particles with dimensions in the nano or micro meter range (Khan *et al.*, 2015). Magnetic nano particles are used in many fieldswhich includes magnetic fluids recording, catalysis, biotechnology/biomedicine, material sciences, photo catalysis, electrochemical and bioeletrochemical sensing, microwave absorption, magnetic resonance imaging [MRI], medical diagnosis, data storage, environmental remediation and, as an electrode, for super-capacitors and lithium ion batteries (LIB)(Singamaneni, 2011; Gao *et al.*, 2009; Xie *et al.*, 2012; An, 2012; Teymourian *et al.*, 2013; Zhang, 2013; Rashad *et al.*, 2012; Frey, 2009; Ge, 2007; Zhou, 2010; Xu *et al.*, 2012; Yoon, 2007; Lu *et al.*, 2007).Magnetic nanoparticles, although may contain other elements, are often iron oxides. Most common iron oxides are magnetite (Fe_3O_4), maghemite (^{3}-Fe_2O_3), hematite ($\pm$-Fe_2O_3) and geothite {FeO(OH)}(Seyda *et al.*, 2012).

Iron oxide can exist in many forms in nature with different chemical compositions, such as magnetite (Fe_3O_4) or maghemite (^{3}-Fe_2O_3).Maghemite and Magnetite, consist single domain, large surface area and quantum size effects(Estelrich *et al.*, 2015). Magnetite nanoparticles have super-paramagnetic behavior and their properties are strongly effect by the method of synthesis.Iron oxide nanoparticles are produce crystallization, size, and shape. Which is highly depends on the synthesis approaches such as co-precipitation or precipitation, sol-gel method, emulsions technique, Hydrothermal Preparation (Hasany *et al.*, 2012).The utilization of iron oxide nanoparticles, due to their unique physical, chemical, thermal and mechanical properties, such as small size, high surface-area-to-volume ratio, surface modifiability, excellent magnetic properties and great biocompatibility (Gu *et al.*, 2015; Gu *et al.*, 2015)Many researches have seen the doping of nanoparticles for improve the pure nanoparticles. Most of the researchers have synthesised the doping elements which is including Co, Cr, Zn, and Mgetc (U *et al.*, 2015).

Akanksha Dixit, Neetika Singh
Reeva Katheria and Gautam Jaiswar
Department of Chemistry,
Institute of Basic Science
Dr. Bhimrao Ambedkar University, Agra
E-mail: gjaiswar@gmail.com

So, in the present paper, prepared undoped Fe_2O_3 and Al doped Fe_2O_3 nanoparticles for the purpose to study the effect of its on magnetic behaviour, morphology and structural properties. The undoped Fe_2O_3 and Al doped Fe_2O_3 nanoparticles were characterized by using different sophisticated techniques VSM, TEM and FTIR.

EXPERIMENTAL

Materials

Ferric chloride, Aluminium nitrate were procured from Merck, India. Deionised water (DW) was obtained from Veb research laboratory, India. All chemicals and materials are used as they received and stored in a cool place.

Synthesis of Iron Oxide (Fe_2O_3) Magnetic Nanoparticles

Iron Oxide (Fe_2O_3) magnetic nanoparticles were synthesized by sol-gel method. For this 4.0 gm of ferric chloride dissolved in 50 ml ofdeionised water (DW). The solution was kept on magnetic stirring at 40°C for 2 hrs and again solution was heated to 80°C for 1 hr, to obtain brown gel was formed. The gel was dried in oven at 150°C for around 5-6 hrsto ensure complete dryness of the gel sample. This gel sample was further calcined in furnace at 400°C for 2 hrs, to obtainbrown powder.

Synthesis of Al doped Fe Nano-powders

Al $(NO_3)_3$was used as a dopant source of Al. the dopant concentration of Alwas varied to 1%, 2%, 4%, and 6% with respect to Fe_2O_3. For this known concentration of Al $(NO_3)_3$was added Fe_2O_3 compound. The mixture was dissolved in DW and stirred with magnetic stirrer at 40 °C for 1 hr, to obtain a brown precipitate was formed. This brown precipitate was dried in oven at 110 °C until fully dried, the residue was dissolved in 5ml deionised water and grinded with the help of the pristle and again this residue kept in oven until completely dryness. Finally, the dried residue was calcined in furnace at 200 °C for 1 hr.The resultant brownpowder obtained was cooled at room temperature (Shaker *et al.*, 2013).

Characterization

Magnetic measurements were carried out using by a Lakeshore VSM 7410 vibrating sample magnetometer (VSM).

TEM was used to study the size and shape of the NPs by TF20: Tecnai $G^2$with an accelerating voltage of 200 kV.For this purpose, the doped nanoparticles were dispersed inabsolute ethanol and sonicated for 20 min. Dispersionswere deposited onto a carbon coated coppergrid, which had been dried in a vacuum at roomtemperature prior to use.

The FTIR Spectrometer was used to evalute the samples of doped nanoparticles. The Instrument used for analysis was Bruker Alfa FT-IR (ATR mode) with ZnSe crystal.

RESULTS AND DISCUSSION

Vibrating Sample Magnetometer (VSM)

Ferromagnetic and magnetic behaviours are analysed by VSM curve at room temperature in Fig. 1. M-H curves showed that un-doped Fe_2O_3as well as Al doped Fe_2O_3 nanoparticles exhibits a ferromagnetic behaviour under the applied magnetic field. For un-doped Fe_2O_3 nanoparticles, the magnetization was completely saturated at 13.53 emu/g which was shows as a super paramagnetic behaviour. It was observed from the figure that Al content increases, the hysteresis curve become more narrow because area of curve decreases with increases of Al content resulted in a decrease in the relative magnetization response(moments). It is obvious that saturation magnetization will be increased by decreasing Al content further, reduction of magnetization with increases of Al content is cause by the replacement of Fe3+ by Al 3+ ions weakness the sub lattice interaction and lower magnetic moments.

The coercivity the that un-doped $Fe_2O_3$and Al doped Fe_2O_3 nanoparticles decrease generally with decrease of particle size as the Al content is increase (Amirabadizadeh *et al.*, 2013; Dinesha *et al.*, 2009).Table 1 summarizes the values of Coercivity (Hci), Magnetization (Ms) and Retentivity (Mr) for the un-doped Fe_2O_3 and Al doped Fe_2O_3 nanoparticles which was obtained from VSM analysis.The Ms value was decrease when Al doped Fe_2O_3 nanoparticles which may be due to the incorporation of the Fe_2O_3.

Table 1. VSM measurements values for Fe_2O_3 and Al doped Fe_2O_3.

	Fe_2O_3	1% Al doped Fe_2O_3 NPs	2% Al doped Fe_2O_3 NPs	4% Al doped Fe_2O_3 NPs	6% Al doped Fe_2O_3 NPs
Coercivity (Hc)	1442.3 G	2956.1 G	2731.6 G	2944.1 G	2599.6 G
Magnetization (Ms)	13.53 emu/g	6.39 emu/g	8.52 emu/g	7.83 emu/g	7.33 emu/g
Retentivity (Mr)	1.46 emu/g	1.75 emu/g	2.72 emu/g	2.17 emu/g	1.96 emu/g

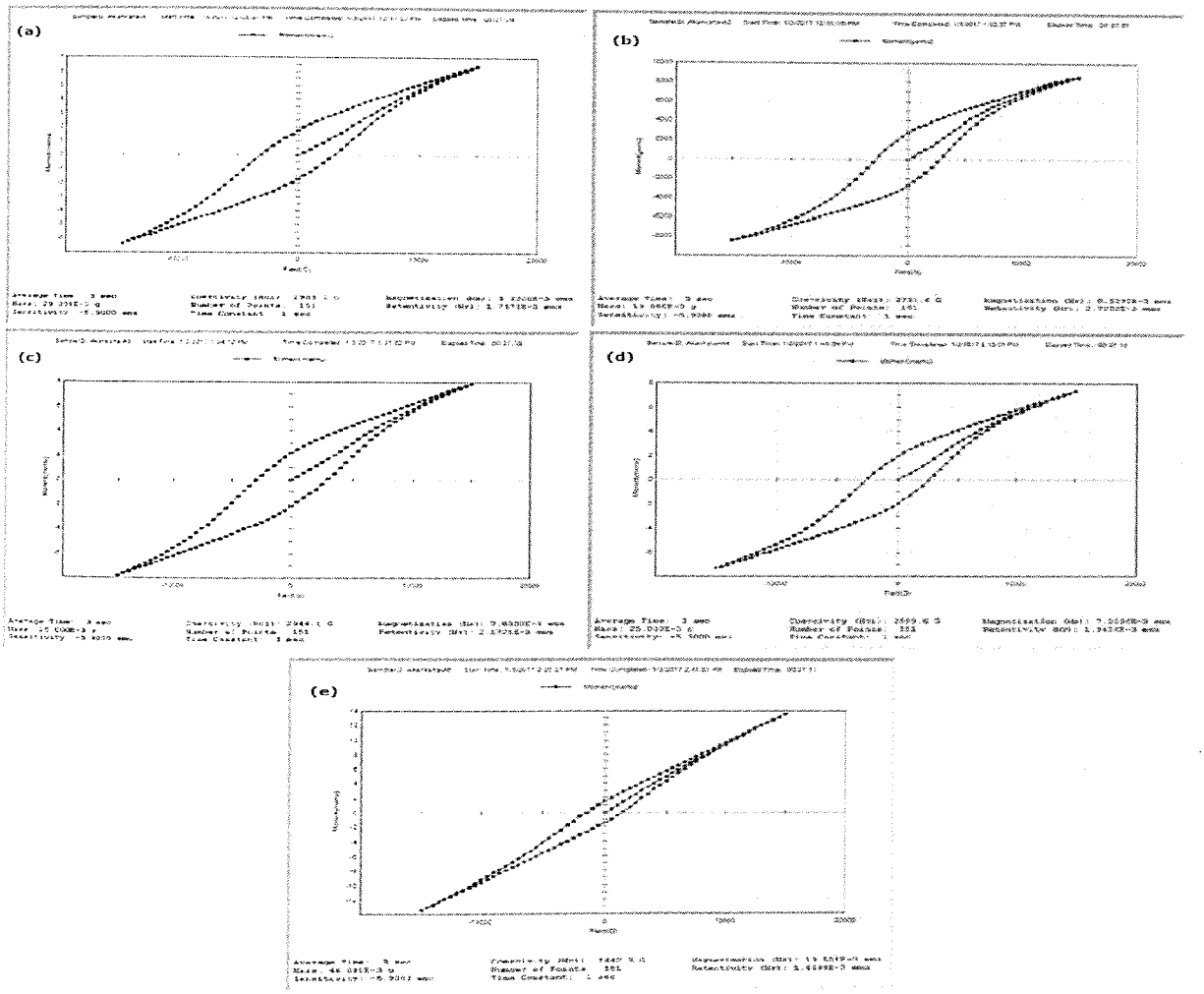

Fig 2. M–H hysteresis curves (a) Al:Fe_2O_3 for1%, (b) Al:Fe_2O_3 for 2%, (c) Al:$Fe_2O_3$for 4%, (d) Al:Fe_2O_3 for 6% and (e) undoped Fe_2O_3 nanoparticles

Transmission Electron Microscope (TEM)

From the TEM analysis, the undoped and doped nanoparticles exhibits morphology of MNPs which is shown in figure 1. The undoped Fe_2O_3 nanoparticles shows diameters around 7.6 nm and Aldoped Fe_2O_3 powders consist of nanosized primary particles with spherical shape in agglomerated powder particles.Itis consists of relatively larger (micron size) chunks of powder particles which is showed as a spherical shape.For 1% and 4% Aldoped Fe_2O_3 nanoparticles

are finer (~50 nm) than those estimated for the 2% and 6% Aldoped Fe_2O_3 powders. The particle size of Aldoped Fe_2O_3 nanoparticles were observed that, for 1% at 11.95 nm, 2% at 15.85, 4% at 14.82 and 6% at 46.77nm. It can be observed that, the dopants of Al shows little effect on the morphology of Fe_2O_3 but the particle size were gradually decreased in doped NPs.

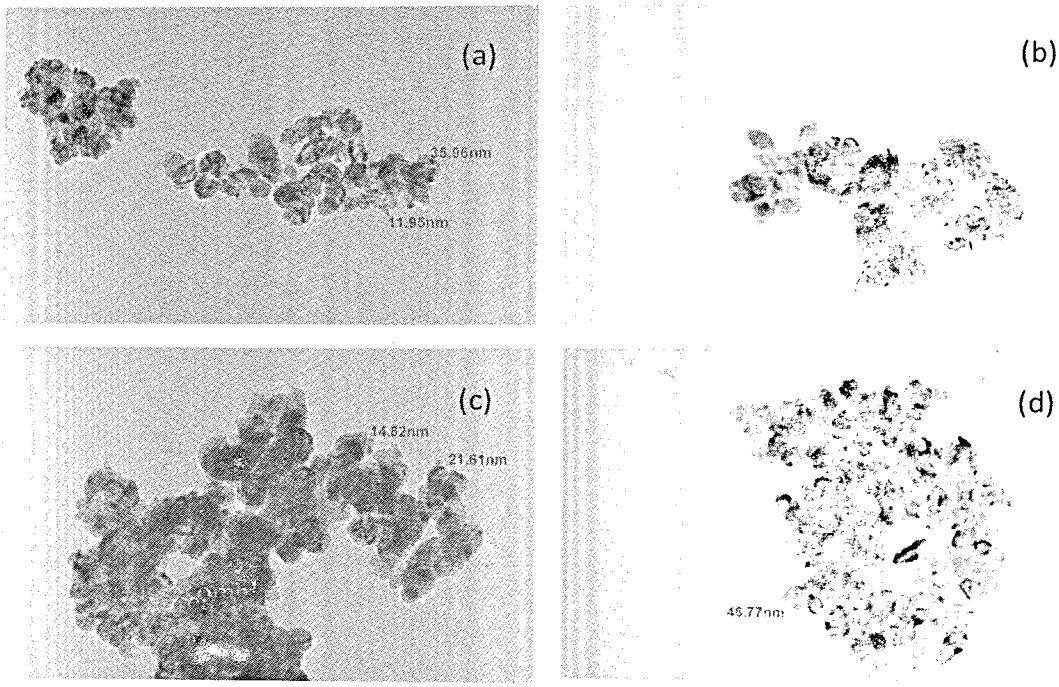

Fig 1.) Images of TEM (a) Al:Fe_2O_3 for1%, (b) Al:Fe_2O_3 for 2%,(c) Al:Fe_2O_3 for 4%,(d) Al:Fe_2O_3 for 6%

Fourier Transform Infrared Analysis Infrared Spectroscopy (FTIR)

FTIR spectra of the prepared undoped Fe_2O_3nanoparticles were recorded in the range 3000-400 cm^{-1} which was represented in fig. 3,the absorption peaks at 550 cm^{-1} corresponding to the Fe–O stretching. From the FTIR spectra of Al doped Fe_2O_3 nanoparticles. The absorption peaks centered at 1589, 1592, and 1594 cm^{-1}which is attributed due to the asymmetric N-O stretching. It can be observed that, the addition of dopant concentration of a small shift and detected for symmetric vibration of Fe–O. So, the results indicate that, the successfully doping of Al with Fe_2O_3 nanoparticles.

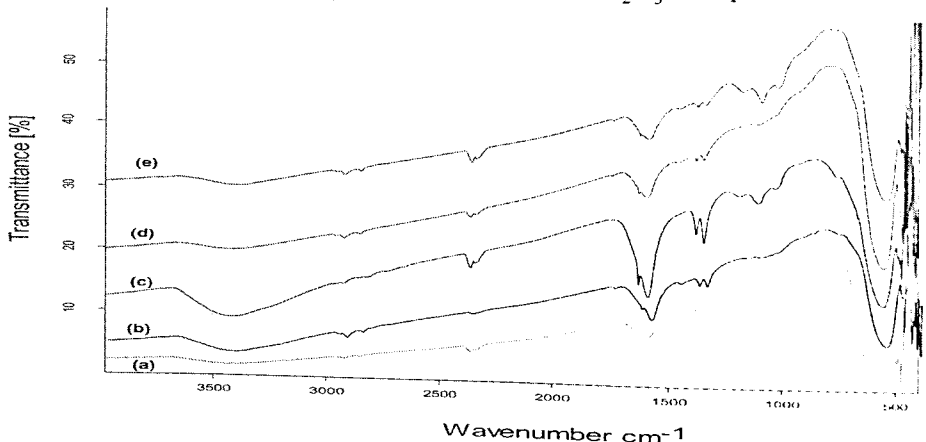

Fig 3. Spectra of FTIR (a) undoped Fe_2O_3 (b)1% Al doped Fe_2O_3 (c) 2% Al doped Fe_2O_3(d) 4% Al doped Fe_2O_3 (e) 6 % Al doped Fe_2O_3

Conclusion

Undoped $Fe_2O_3$and Al doped Fe_2O_3nanoparticles were prepared through sol-gel method and a series with variation of dopant concentrated for the formation of doped Fe_2O_3were prepared by using aluminium nitrate as Al precursor.The samples were characterized by various techniques such as VSM, TEM and FTIR, to find out the particle size of undoped and doped nanoparticles. It was found the VSM result shows that, the saturation magnetization of undoped Fe_2O_3 and Al doped Fe_2O_3were 13.5 emu/g and 7.83 emu/g.and show super paramagnetic properties.TEM result shows the formation of Al doped Fe_2O_3 and undoped nanoparticles with average crystallite size of 14 nm and 7.6 nm. It is demonstrate that, the spherical morphology and the particles were agglomerates with almost fused doped particles of about 200 to 500 nm size.FTIR result showed that the undoped and doped nanoparticles, the absorption band at 1589cm^{-1}which is due to asymmetric stretching of N-O and Fe_2O_3 nanoparticles indicated absorption peaks at 550 $cm.^{-1}$The prepared doped Fe_2O_3 magnetic nanoparticles may be a significant role in many different fields such as Industrial,electrochemical and bio-electrochemical sensing, microwave absorption, magnetic resonance imaging (MRI), medical diagnosis, data storage, environmental remediation etc.

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USE OF N-GRAMS FOR FINDING THE CHRONOLOGICAL CHANGE IN THE WRITING STYLE OF MUNSHI PREMCHAND: A FAMOUS HINDI NOVELIST

RICHA SINGHAL AND VINEETA SINGH

ABSTRACT : Stylometry is the study of the chronology and development of an author's work based specially on the recurrence of particular turns of expression or trends of thought. Stylometry is the application of the study of linguistic style, usually to written language. Stylometry is often used to attribute authorship to anonymous or disputed documents. Much work has been done so far in this field. So taking into account all the past as well as present recent works the researcher thought of applying the different authorship attribution techniques on the Hindi authors. Since Hindi literature is also very vast and not inferior in any respect to any other literature of the world. It is decided to keep it as the base of the proposed research work. In the present work an attempt has been made to compare the writing style of the Hindi novelist Munshi Premchand with the passage of time.

Key words: Stylometry, Hindi authors, multivariate techniques, n-grams

1. INTRODUCTION

Stylometry denotes quantitative analysis of some written text that yields information about the style it is composed with and through that about the author of this text. Authorship attribution is one of the applications of Stylometry; and Stylometry is the science of measuring literary style. It is believed that every author has an inherent style of writing, which is peculiar to himself. A traditional literary scholar captures the peculiarities in style of an author by impression (Engelson, Koppel and Avneri, 1998; Koppel, Schler, 2005). What statisticians offer to this filed is to help quantify the style, and hence to change a subjective method into an objective technique which is referred to as "Non-Traditional Stylometry". Methods have been tried on texts of different languages (Yule. G 1938; Brinegar.S.C 1963; Peng, F., Schuurmans.D, Wang.S 2004; Markov et al 2017).

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Richa Singhal
Central Council for Research in Ayurvedic Sciences, Institute of AYUSH, Government of India, New Delhi
richa.singhal2k@gmail.com

Vineeta Singh
Department of Statistics,
Institure of Social Statistics,
Dr. Bhimrao Ambedkar University, Agra
vineeta20012002@yahoo.co.in

In statistical analysis of literary texts one tries to apply an objective methodology to works that have received impressionistic treatment for a long time. In subjective analysis of literary style, experts use literary style of the text, which is not quantifiable, as an important criterion in their judgments. Subjective approach can rarely lead to a unique solution acceptable to all the scholars. Statistical quantitative methods provide objective components for judgments. In the quantitative approach, by carefully analyzing the style of the text one tries to find out how to characterize the style of an author numerically and determine sets of features (variables) in a text that most accurately describe the author's style.

2. Stylistic Features

The first problem in any pattern recognition study is to derive a set of features over which to classify. Features over a document space are meant to reveal what could be called an author's fingerprint, or an aspect of text that an author cannot help but including to their very nature. An open problem in the Stylometry domain is a theoretical basis for future selection, or even an explanation of why some features produce better results in discriminating than others.

Researchers in authorship attribution typically seek the kinds of features use of which is roughly invariant for a given author (or author class) across topics but which might vary from one author (or author class) to another. Generally, researchers use feature sets that are relatively common. Thus, for example, the seminal authorship attribution work of Mosteller and Wallace (Mosteller and Wallace, 1963; Mosteller, Wallace, 1964) on the Federalist Papers used a set of several hundred function words, that is, words that are context-independent and hence unlikely to be biased towards specific topics. Other features used in even earlier work are complexity-based: average sentence length, average word length, type/token ratio and so forth (Williams, 1975; Baayen, Halteren, Tweedie, 1996; Stamatatos, Fokotakis, Kokkinakis, 2001; Escobedo, et al 2013). Recent technical advances in automated parsing and part-of-speech (POS) tagging have facilitated the use of syntactic and quasi-syntactic features such as POS n-grams (Stamatatos, Fokotakis, Kokkinakis, 2001). Other recent work considers language modeling using letter n-grams (Nirkhi, et al 2014).

Previously published work of researchers is also based on Hindi novelists by using word length, sentence length and function words (Singh, 1989; Singh, and Singhal, 2007; Singh, and Singhal, 2008). In this paper researcher have used Lexical N-gram words. Lexical N-grams frequencies are subdivided into word N-grams and character N-grams. For example "the" is a character tri-gram and "the book: is a word bi-gram. In this paper focus have been made on character N-grams frequencies. The character N-grams means one letter, two letter words and so on ....For example in Devangri script का, था, मैं थी are 1-gram words, कभी, हम, नहीं, मेरे are 2-gram words, कितना, हमारा, उसका, जितना are 3-gram words and so on.

For the present study all the words having half letters as used in devangri script like क्यों, क्या, उन्हें, स्त्री have been excluded. These features were used because they will provide a content independent approach.

3. Literary Corpus

For the present study the total writing span of Munshi Premchand has been divided into two strata, one having the stories written by him during the first five years of his writing span i.e. during 1915-1920 and second strata having the stories written by him during last five years of his writing span i.e. during 1930-1935. For this purpose, the stories are classified according to the year in which they were written and then 10 stories from each strata were selected by simple random sampling.

So the first strata denoted as L^{th} Strata containing a set of 10 stories written during 1915-1920 and the second strata denoted as M^{th} Strata containing another set of 10 stories written during 1930-1935 formed our Literary Corpus for this study. A list of these 20 stories along with the year in which they were written is given in Appendix – I.

4. Method

In order to find out that whether there has been any change in the writing style of Premchand over a span of 20 years two methods were used. The methods used are listed below:

1) Application of Discriminant function

2) Application of Discriminant function and Ranking for Identification.

4.1 Discriminant Function

Once the frequency of n-grams was calculated a discriminant function is prepared by taking the weight for the i^{th} n-gram.

$$W_i = \frac{\bar{P}_{iL} - \bar{P}_{iM}}{S_{iL}^2 + S_{iM}^2}$$

Where $P_{iL} = \frac{\sum_{i=1}^{10} P_{ijL}}{10}$ and $S_{iL}^2 = \frac{WSS_{iL}}{9}$

Where Within Strata Sum of Square for L^{th} Strata (WSS_{iL})

$$(WSS)_{iL} = \sum_j f_{ijL} P_{ijL} - f_{i.L} P_{i.L}$$

$$P_{ijL} = \frac{f_{ijL}}{n_{jL}}$$

Where f_{ijL} is the frequency of i^{th} n-gram in j^{th} story of L^{th} Strata.

P_{ijL} is the proportion of i^{th} n-gram in story of.

$f_{i.L}$ and $P_{i.L}$ $P_{i.L}$ denotes the sum and frequency of the stories of the set of L^{th} Strata for i^{th} n-gram. Given a story the discriminant function Y had a value

$$Y = \sum_i W_i P_i$$

Where W_i is the weight corresponding to the i^{th} n-gram and $P_i = f_i \mid n$

Where f_i is the frequency of i^{th} n-gram in the story and n is the total number of words in the story.

Let us denote the value of the discriminant function Y for the j^{th} the story of strata L by $Y_{jL.}$ Then

$$\bar{Y}_L = \frac{1}{10}\sum_{i=1}^{10} Y_{jL}$$

$$S_M^2 = \frac{1}{9}\sum_{j=1}^{10} (Y_{jM} - \bar{Y}_M)^2$$

$$S_L^2 = \frac{1}{9}\sum_{j=1}^{10} (Y_{iL} - \bar{Y}_L)^2$$

$$\bar{Y}_M = \frac{1}{10}\sum_{i=1}^{10} Y_{jM}$$

4.2 Use of Discriminant Function for Identification

For a given story, to decide whether it is of strata L or M, the following statistics are calculated.

$$t_L = \frac{Y - \bar{Y}_L}{S_L}$$

$$t_M = \frac{Y - \bar{Y}_M}{S_M}$$

If % t_L %is smaller than % t_M %, we decide that the story belongs to L^{th} strata otherwise to M^{th} strata. Where Y is the value of the discriminant function for the given story.

4.3 Use of Discriminant Function and Ranking for Identification

After finding the value of discriminant function for the two samples ranks (from lowest to highest) have been assigned to all the discriminant function scores. The combined median for all the scores in both the samples are calculated. The sum of ranks has been calculated for both the samples separately. If H_L and H_M denotes the rank sums for the two samples (two strata L and M) and $H_L > H_M$ then the decision rule is that if discriminant score for a given story is greater than median than the story is of strata L otherwise of strata M.

5. Application of the method

Table below gives the Within Sum of Squares for both Strata and Weights for all the n-grams.

Table 5.1 Within Sum of Squares and Weight for both the Strata

Variable No	P_{iL}	P_{iM}	WSS_{iL}	WSS_{iM}	S^2_{iL}	S^2_{iL}	Weight (W_i)
1-gram	*0.259396*	*0.257998*	*4.429303*	*3.193036*	*0.492145*	*0.354782*	*0.001650*
2-gram	*0.428955*	*0.401411*	*22.995917*	*150.950867*	*2.555102*	*16.772319*	*0.001425*

3-gram	0.220823	0.200621	102.650703	7.567664	11.405634	0.840852	0.001650
4-gram	0.045930	0.037448	1.869060	4.027938	0.207673	0.447549	0.012945
5-gram	0.009725	0.010590	0.606526	0.596782	0.067392	0.066309	-0.006470

The value of discriminant function calculated for all the 20 stories of strata L and strata M is given in the table below:

Table 5.2 Discriminant Function Scores for both the Strata

Story No	Discriminant Function Scores	
1	0.001881	0.001906
2	0.001910	0.001733
3	0.002057	0.001515
4	0.001932	0.001833
5	0.001867	0.001733
6	0.001896	0.001284
7	0.001764	0.001760
8	0.002308	0.001825
9	0.001934	0.001868
10	0.001802	0.001991
Mean	0.001935	0.001745
Standard Deviation	0.000153	0.000206

After that the test statistics t_L and t_M are calculated for all the 20 stories, these values of t_L and t_M are given in Table 6.7. First and second column gives the values of test statistics t_L and t_M respectively for the stories of strata L. Similarly next two columns give the values of and t_M for the stories of strata M.

If $|t_L| < |t_M|$ we infer that the story is of strata L otherwise of strata M. The lesser of the absolute values is indicated by an asterisk (*) in the Table 5.3

Table 5.3 Identification on the basis of Discriminant Function Scores and t-values

Distance From	L^{th} Strata		M^{th} Strata	
Story No.	t_L	t_M	t_L	t_M
1	*-0.355006	0.660217	-0.190759	0.782183
2	*-0.163222	0.802631	-1.323007	*-0.058600
3	*0.799750	1.517713	-2.744132	*-1.113897
4	*-0.021368	0.907969	-0.665574	*0.429595
5	*-0.447762	0.591338	-1.324752	*-0.059896
6	*-0.255315	0.734245	-4.257952	*-2.238026
7	-1.118558	0.093220	-1.142814	*0.075208
8	*2.435961	2.732728	-0.721998	*0.387697
9	*-0.004711	0.920338	-0.437613	0.598874
10	-0.869769	0.277965	0.367671	1.196861

From the table 6.7 we can see that for the discriminant function for the first story of L^{th} Strata value of t_L = -0.355006 and value of t_M = 0.660217. Since $|t_L| < |t_M|$ for the first story of L^{th} Strata, so it is concluded that this story belongs to L^{th} Strata.

Similarly for the first story of M^{th} Strata t_L = -0.190759 and t_M = 0.782183. Over here since $|t_M| < |t_L|$ is concluded that this story belongs to M^{th} Strata.

For the second method combined ranks have been assigned to discriminant scores of all the 20 stories. These discriminant scores and their ranks are given in Table 5.4

Table 5.4 Identification on the basis of Discriminant Function Scores and Ranking

	L^{th} Strata		M^{th} Strata	
Story No	*Discriminant Function Values*	*Rank*	*Discriminant Function Values*	*Rank*
1	* 0.001881	12	0.001906	14
2	*0.001910	15	* 0.001733	4
3	*0.002057	19	*0.001515	2
4	*0.001932	16	*0.001833	9
5	0.001867	10	*0.001733	3
6	*0.001896	13	*0.001284	1
7	0.001764	6	*0.001760	5
8	*0.002308	20	*0.001825	8
9	*0.001934	17	0.001868	11
10	0.001802	7	0.001991	18
Rank sum	135		75	

Median = 0.001867

From the Table 5.4 we can see that H_L = 135 and H_M = 75, i.e. $H_L > H_M$. Hence if the discriminant value of the story of L^{th} Strata is greater than the median than it is concluded that the story belongs to L^{th} Strata. Since the discriminant score of the first story of L^{th} Strata = 0.001881 which is greater than the median 0.001867. Therefore this story is identified as belonging to L^{th} Strata.

6. Conclusion

By using the discriminant function and t-values the percentage of correct identification is 80% for both Strata. And by discriminant function and ranking method percentage of correct identification for the L^{th} strata is 80% while for M^{th} Strata it is 70%.

On testing the hypothesis that the two strata do not differ significantly in the mean value of the chosen discriminant function by applying the usual t-test we got the calculated value of t as 2.3. For 18 degrees of freedom at 5% level of significance the critical value of t is 2.10. Since the calculated value of t is greater than the critical value of t, so it is concluded that there is a great difference in the mean discriminant values of both the Strata. Hence the means of the discriminant functions differs significantly for both the Strata.

Since by using this method also we are able to identify 75% stories correctly for both the method combined. Therefore, we are more precise in our conclusion that there has been a change in the writing style of Premchand over a span of 20 years.

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COMPARATIVE STUDY ON NEWBORN'S HEALTH THROUGH APGAR SCORE IN GOVERNMENT AND PRIVATE HOSPITAL IN AGRA CITY.

DEEPTI SINGH

ABSTRACT: Children are the wealth of the nation as they constitute one of the most important segments of the population. The Apgar score is a useful and immediate tool used in the assessment of newborns. The factors that influence its final score may be related with labor, mother or infant itself.The Apgar scoring system was intended as an evaluative measure of a newborn's condition at birth and of the need for immediate attention.200 deliveries were included in the study. Out of 200 pregnant women, majority of them (95.0%) had live births and remaining (5.0%) had still births. In government hospital still birth ratio is more than the private hospital. Positive and significant correlations were obsereved between BMI of pregnant women, antenatal visits of pregnant mothers with length and weight of newborn delivered at government and private hospital ($p < 0.05$) seperatly. The mean apgar score at 1 minute of newborn was more among pregnant women at private hospital (7.87) as compared to pregnant women at government hospital (7.08). Statistically, significant difference in mean apgar score at 1 and 5 minute of newborn were observed between pregnant mothers at government and private hospital ($t=2.168$, $p<0.05$), ($t=3.214$, $p<0.05$)respectively . Positive and significant correlations were obsereved between BMI of pregnant women, antenatal visits of pregnant mothers with length and weight of newborn delivered at government and private hospital ($p < 0.05$) seperatly.

KEYWORD: Pregnant mother, BMI, Apgar Score, Livebirth, Still birth.

INTRODUCTION : Healthy mothers and children are building blocks for a strong future of our country. Nutrition of mother during pregnancy is likely to affect the outcome of pregnancy. Antenatal care of the mother is to achieve at the end of pregnancy a healthy newborn baby. The Apgar scoring system is a comprehensive screening tool to evaluate a newborn's condition at birth . Newborn infants are evaluated based on five variables: heart rate, respiratory effort, muscle tone, reflex irritability, and color. A numerical score of 0–2 is assigned in each category for a maximum score of 10. The test is usually given twice: once at 1 minute after birth, and again at 5 minutes after birth. Sometimes, if there are concerns about the baby's condition, the test may be given again. A newbornwho scores a 7 or above on the test is considered in good health. A lower score does not mean that your baby is unhealthy. It means that your baby may need some immediate medical care, such as suctioning of the airways or oxygen to help him or her breathe better. Perfectly healthy babies sometimes have a lower-than-usual score, especially in the first few minutes after birth. A slightly low score (especially at 1 minute) is common, especially in babies born after a high-risk pregnancy, through a C-section, after a complicated labor and delivery, prematurely at 5 minutes after birth, the test is given again.

Deepti Singh
Department of Food and Nutrition
Institute of Home Science,
Dr. Bhimrao Ambedkar University, Agra
deepti.chauhan26@gmail.com

Apgar score Table:

Sr. No.	Sing	0	1 min	5 min	1	1 min	5 min	2	1 min	5 min
1.	Heart rate	No heart beat			Under 100 beat per min			100 to 140 beats per min		
2.	Respiratory	No Breathing for 60 sec.			Irregular, shallow breathing			Strong breathing and crying		
3.	Reflex irritability sneezing coughing and grimacing	No response			Weak reflexive responce			Strong reflexive response		
4.	Muscle tone	Completely limp			Weak movement of arms and legs			Strong movement of arms and legs		
5.	Colour	Blue body, arms and legs			Body pink with blue arms and legs			Body arms and Igscmpletely pink		

One Minute Score = , Five Minute Score =

OBJECTIVE:

- To assess the health of newborn through apgar score in government and private hospital.
- Observations related to correlation of health,andantinatal care of pregnant mothers with weight, apgar score at 1 and 5 minutes birth of newborn

METHODOLOGY: Multistage stratified random sampling technique was used for selecting the mothers as sample for the present study. The sample comprised of 200 pregnant women belonging to urban area of Agra District from one government and one private hospital. A questionnaire was formulated to elicit information regarding the antenatal care during pregnancy and after delivery among pregnant women in relation to certain selected variables.

STATISTICAL ANALYSIS: After collecting the

required information from the subjects, the schedules were coded numerically and data were classified into simple and complex tables. Keeping in view the objectives of the study, the data was analyzed by applying percentage, arithmetic mean, standard deviation, t-test, correlation coefficient t-test for correlation coefficient, chi square test for drawing the conclusion.

RESULT AND DISCUSSION:

Table 1 : Distribution of subjects at government and private hospital according to weight of newborn.

Weight of Newborn in kg.	Government Hospital		Private Hospital		Total	
	No.	%	No.	%	No.	%
1–2	15	15.0	4	4.0	19	9.5
2–3	71	71.0	71	71.0	142	71.0
3–4	14	14.0	25	25.0	39	19.5
Total	100	50.0	100	50.0	200	100.0
Mean	2.43		2.63		2.53	
SD	0.41		0.47		0.45	
T	3.207					
P	<0.05					

Above table 1 shows the distribution of subjects at government and private hospital according to weight of newborn. Among the 100 subjects who had their delivery at government hospital, majority of them (71.0%) delivered a new born having weight of 2-3 kg, followed by 15.0% having weight of 1-2 kg. and the minimum (14.0%) having weight of 3-4 kg; while among the 100 pregnant women at private hospital, majority of them (71.0%) delivered a new born having weight of 2-3 kg., followed by 25.0% having weight of 3-4 kg. and the minimum (4.0%) having weight of 1-2 kg.

The mean weight of newborn was more among pregnant women at private hospital (2.63 kg.) as compared to pregnant women at government hospital (2.43 kg.). Statistically significant difference in mean weight of the newborn was observed between pregnant mothers at government and private hospital ($t = 3.207$, $p < 0.05$).

Yajnik et.al. (2015) conducted a study on the neonatal anthropometry in Pune and Southampton and observed that there was slightly higher mean birth weight of new born (3.008 kg. and 3.006 kg.) respectively as compared to the present study.

Table 2: Distribution of subjects at government and private hospital according to outcome of delivery.

Outcome of Delivery	Government Hospital		Private Hospital		Total	
	No.	%	No.	%	No.	%
Live Birth	94	94.0	96	96.0	190	95.0
Still Birth	6	6.0	4	4.0	10	5.0
Total	100	50.0	100	50.0	200	100.0

χ^2 =0.421, df =1, p>0.05.

Above table 2 indicates the distribution of subjects according to place of delivery and outcome of delivery (termination of pregnancy). Out of 200 pregnant women, majority of them (95.0%) had live births and remaining (5.0%) had still births.Among the 100 subjects who had their delivery at government hospital, majority of them (94.0%) had live births and remaining (6.0%) had still births; while among the 100 pregnant women at private hospital, the majority of them (96.0%) had live births and minimum (4.0%) had still births. Statistically, insignificant association was observed regarding the termination of pregnancy with expecting mothers at government and private hospital (=0.421, df =1, p >0.05). The data from India, Nepal and Sri Lanka, Coyaji et.al. (1994) observed a higher proportion of live births and the caesarean section rate was 2 percent in India, 0.5 percent in Nepal and 4 percent in Sri Lanka which supported the finding of the present study.

Table 3 : Distribution of subjects at government and private hospital according to apgar score at 1 minute of new born.

Apgar Score at 1 Minute	Government Hospital		Private Hospital		Total	
	No.	%	No.	%	No.	%
1–5	9	9.0	16	16.0	25	12.5
5–7	42	42.0	17	17.0	59	29.5
8–10	49	49.0	67	67.0	116	58.0
Total	100	50.0	100	50.0	200	100.0
Mean	7.08		7.87		7.48	
SD	2.49		2.66		2.60	
T	2.168					
P	<0.05					

Above table 3 highlights the distribution of subjects at government and private hospital according to apgar score at 1 minute of new born.Among the 100 subjects who had their delivery at government hospital, majority of them (49.0%) delivered a new born having apgar score at 1 minute of newborn of 8 - 10, followed by 42.0% having apgar score at 1 minute of new born of 5 - 7 and the minimum (9.0%) delivered a new born having apgar score at 1 minute of new born of 1-5; while among the 100 pregnant women at private hospital, majority of them (67.0%) delivered a new born having apgar score at 1 minute of newborn of 8 - 10, followed by 17.0% having apgar score at 1 minute of newborn of 5 - 7 and the minimum (16.0%) delivered a new born having apgar score at 1 minute of newborn of 1 - 5.The mean apgar score at 1 minute of newborn was 7.48 among 200 pregnant women in the present study. The mean apgar score at 1 minute of newborn was more among pregnant women at private hospital (7.87) as compared to pregnant women at government hospital (7.08). Statistically, significant difference in mean apgar score at 1 minute of newborn was observed between pregnant mothers at government and private hospital ($t=2.168$, $p<0.05$).

Table 4 : Distribution of subjects at government and private hospital according to apgar score at 5 minute of new born.

Apgar Score at 5 Minute	Government Hospital		Private Hospital		Total	
	No.	%	No.	%	No.	%
1–5	6	6.0	2	2.0	8	4.0
5–7	34	34.0	20	20.0	54	27.0
8–10	60	60.0	78	78.0	138	69.0
Total	100	50.0	100	50.0	200	100.0
Mean	7.84		8.76		8.30	
SD	2.15		1.86		2.00	
T	3.214					
P	<0.05					

Above table 4 : Distribution of subjects at government and private hospital according to apgar score at 5 minute of new born. Among the 100 subjects who had their delivery at government hospital, majority of them (60.0%) delivered a new born having apgar score at 5 minute of new born of 8 - 10, followed by 34.0% having apgar score at 5 minute of new born of 5 - 7 and the minimum (6.0%) delivered a new born having apgar score at 5 minute of new born of 1-5; where as among the 100 pregnant women at private hospital, majority of them (78.0%) delivered a new born having apgar score at 5 minute of new born of 8 - 10, followed by 20.0% having apgar score at 5 minute of new born of 5 - 7 and the minimum (2.0%) delivered a new born having apgar score at 5 minute of new born of 1 - 5.

The mean apgar score at 5 minute of new born was more among pregnant women at private hospital (8.76) as compared to pregnant women at

government hospital (7.84). Statistically, significant difference in mean apgar score at 5 minute of newborn was observed between expecting mothers at government and private hospital ($t = 3.214$, $p<0.05$).

Table5:Correlation between body mass index of subjects with length, weight and apgar score at 1 and 5 minutes of the new born delivered at government hospital.

Parameter	Statistical Values				
	Mean	SD	r	T	p
BMI of Pregnant Mother	21.67	2.99			
Length of Newborn in cms.	45.82	3.94	+0.224	2.275	<0.05
Weight of Newborn in kgs.	2.42	0.41	+0.271	2.787	<0.05
Apgar Score at 1 Minute	7.08	2.49	+0.074	0.705	>0.05
Apgar Score at 5 Minutes	7.84	2.15	+0.148	1.484	>0.05

Above table 5 highlights the correlation between body mass index of subjects with length, weight and apgar score at 1 and 5 minutes of the new born delivered at government hospital.

Positive and significant correlations were observed between body mass index of pregnant women with length and weight of newborn delivered at government hospital ($p<0.05$) that is, as the body mass index of the pregnant women at government hospital increased the length and weight of new born also increased and vice-versa.

Positive and insignificant correlations were also observed between body mass index of pregnant women with apgar score at 1 and 5 minute of new born delivered at government hospital at 5% level of significance.

Johnson (1994) also reported the similar findings as they observed that maternal anthropometric measurements significantly correlated with pregnancy outcomes included delivery weight and height ($p<0.05$).

Table 6 : Correlation between body mass index of subjects with length, weight and apgar score at 1 and 5 minutes of the new born delivered at private hospital.

Parameter	Statistical Values				
	Mean	SD	r	t	p
BMI of Pregnant Mother	22.51	2.61			
Length of Newborn in cms.	46.36	3.47	+0.260	2.666	<0.05
Weight of Newborn in kgs.	2.63	0.47	+0.283	2.921	<0.05
Apgar Score at 1 Minute	7.87	2.68	+0.105	1.045	>0.05
Apgar Score at 5 Minutes	8.76	1.86	+0.158	1.584	>0.05

Above table 6 shows the correlation between body mass index of subjects with length, weight and apgar score at 1 and 5 minutes of the newborn delivered at private hospital.

Positive and significant correlations were observed between body mass index of pregnant women with length and weight of newborn at private hospital ($p<0.05$) that is, as the body mass index of the pregnant at private hospital increased, the length and weight of newborn also increased and vice-versa.

Positive and insignificant correlations were also observed between body mass index of pregnant women with apgar score at 1 and 5 minutes of newborn at private hospital at 5% level of significance.

Table 7 : Correlation between antenatal visits of subjects with length, weight and apgar score at 1 and 5 minutes of the new born delivered at government hospital.

Parameter	Statistical Values				
	Mean	SD	r	t	p
Antenatal Visits of Pregnant Mother	3.26	1.07			
Length of Newborn in cms.	45.82	3.94	+0.250	2.556	<0.05
Weight of Newborn in kgs.	2.42	0.41	+0.541	6.368	<0.05
Apgar Score at 1 Minute	7.08	2.49	–0.056	0.555	>0.05
Apgar Score at 5 Minutes	7.84	2.15	–0.129	1.288	>0.05

Above table 7 shows the correlation between antenatal visits of pregnant women with length, weight and apgar score 1 and 5 minutes at government hospital.

Positive and significant correlations were observed between antenatal visits of pregnant women with length and weight of newborn at government hospital ($p<0.05$) that is, as the antenatal visits of pregnant women at government hospital increased, the length and weight of newborn also increased and vice-versa.

Negative and insignificant correlations were observed between antenatal visits of pregnant women with apgar score at 1 and 5 minutes of new born at government hospital at 5% level of significance.

Similar finding was reported by Krishnaerey et.al. (2015) in their study that definite trend of increase in mean birth weight was observed with increasing number of antenatal visit of mothers.

Table 8 : Correlation between antenatal visits of subjects with length, weight and apgar score at 1 and 5 minutes of the new born deivered at private hospital.

Parameter	Statistical Values				
	Mean	SD	r	t	p
Antenatal Visits of Pregnant Mother	3.26	1.07			

Length of Newborn in cms.	45.82	3.94	+0.250	2.556	<0.05
Weight of Newborn in kgs.	2.42	0.41	+0.541	6.368	<0.05
Apgar Score at 1 Minute	7.08	2.49	–0.056	0.555	>0.05
Apgar Score at 5 Minutes	7.84	2.15	–0.129	1.288	>0.05

Above table 8 reveals the correlation between antenatal visits of pregnant mother with length, weight and apgar score of the newborn delivered at private hospital.

Positive and significant correlations were observed between antenatal visits of pregnant women with length and weight of newborn delivered at private hospital ($p<0.05$) that is, as antenatal visit of the subjects increased, the length and weight of the new born delivered at private hospital increased and vice-versa.

Positive and insignificant correlations were also observed between antenatal visits of pregnant women with apgar score at 1 and 5 minutes of newborn delivered at private hospital at 5% level of significance.

Similar finding was reported by Sarah (1991) as they indicated positive relationship between the number of prenatal visits and infant apgar scores.

CONCLUSION: On the basis of the results obtained from the present study it can be concluded that majority of newborn whose apgar scores at 1 minute and 5 minute of 8-10 respectively which was more among pregnant women at private hospital as compared to pregnant women at government hospital. Thus we can say that the private hospital's newborn healthy as compared the government hospital.

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HORMONAL IMBALANCE IN YOUNG FEMALE DUE TO CHANGE IN LIFE STYLE

RASHMI SHARMA & ARCHANA SINGH

ABSTRACT: Hormones are essential to your overall wellbeing. They relay chemical messages throughout the body, helping to keep your emotions and body systems in check. One of the key body systems affected by the balance of the hormones in your body is the reproductive system. A female hormonal imbalance could cause heavy periods, infertility, and endometriosis. (Imbalances can affect other body systems, as well.). Hormones cause several physical and mental changes in female aged between 15-45 years. These changes occur due to improper diet, stressfull life style. This study consists of findings of hormonal imbalance in female ages between 15-45 years. Random sampling method and a cross section sample was used to collect data from young females of the 15-45 age groups in Agra city. About 200 females participated in the study where more than 50% of the females had irregular period, about 38% of females had excessive hair growth on their face and body, and around 12% had both the conditions.

KEYWORDS: *Hormonal imbalance, irregular period, excessive hair growth, pre-menopause.*

INTRODUCTION : In human health hormones play a vital role especially in case of female. Hormonal fluctuations especially for estrogens and progesterone in female have adverse impact on her mood, sexual desire, ovulation and fertility of a female. Hormonal disturbance cause pre-menopause and some other symptoms like hot flashes and neck or shoulder's stiffness. Female hormonal imbalance can be caused by uses of contraceptives and hormone replacement therapy (HRT), rising in stress level, poor diet, environmental changes including pollution, excessive consumption of non-organic and animal products, that have excessive amounts with estrogens. Treatment option for hormonal imbalance included herbal and homeopathic medicines. A balance diet is crucial for hormonal health signs and symptoms of menstruation, acne, oily skin, excessive hair growth, allergy, low sexual desire, weight gain, headache, urinary tract infection (UTI) and premenstrual syndrome(PMS).

Although the symptoms of hormone imbalance can be troubling at any age but the good news is that they can often be **treated effectively in a healthy and natural way.** A woman suffering from hormonal imbalance would probably be surprised by how quickly her symptoms improve by following the right advice. Though it used to be in vogue to **prescribe hormone replacement therapy** (HRT) to treat this fundamental imbalance, persistent links to breast and ovarian cancer, heart disease, and blood clots have caused most healthcare professionals to rethink this drastic option. Many agree that the most effective approach is to combine **a few changes in lifestyle with alternative treatment options.**

Three levels of approaches can be considered for treating hormonal imbalance. They are categorized as: (1) **Lifestyle Changes**, (2) **Alternative Medicine** and (3) **HRT**. It is recommended to begin with the least risky option, lifestyle changes, before progressing to the next stage of treatment. HRT should be used only in extreme cases.

Hyman (2007) wrote an editorial in the magazine Alternative Therapies in Health and Medicine, about the life cycles of women: restoring balance. He finally

Rashmi Sharma
Department of Physiology
Institute of Home Science
Dr. Bhimrao Ambedkar University, Agra
rashmi22sharma@gmail.com

Archana Singh
Department of Food and Nutrition
Institute of Home Science
Dr. Bhimrao Ambedkar University, Agra

concludes that exercise is also important, as it helps to regulate hormonal function. Use of hot baths at night, massage, yoga, deep breathing, or meditation can help balance hormones via effects on the HPA axis. Women are not defective, but rather wonderfully designed and sensitive beings that can thrive and be healthy with attention to a few natural laws of biology. Medications are not needed for women to be healthy.

Dr. Chacon in Nature and Health Magazine, says "Macafem nutrients help restore natural hormones in women. Unlike hormone drugs, which are basically resumed in taking synthetic hormones, Macafem acts totally different in your body. It nourishes and stimulates your own natural hormones production, by inducing the optimal function of the pituitary and endocrine glands" Although Levis and Griebeler (2010) worked in this direction and obtained the role of Soy Foods in the treatment of menopausal symptoms.

Further as per the survey of Naveed et al (2015) on the causes or reasons of hormonal disturbance in young females, they asked 127young females about their food intake practice. 70 young females faced irregular periods from 127 young females. 10 of them took junk food, 5 of them vegetarian food, 7 of them spicy food, 42 of them all type foods, 2 of them vegetable and junk food both and 4 of them took both junk and spicy foods. 49 young females are facing abnormal hair growth on body and face out of 127 young females. 2 of them take junk food, 3 of them take vegetarian food, 9 of them take spicy food, 33 of them take all type foods, 1 of them takes vegetable and junk food both and 1 of them take both junk and spicy foods. 8 young females faced irregular periods and abnormal hair growth on body and face out of 127 young females. 2 of them take junk food, 3 of them take spicy food, 2 of them take all type foods, and 1 of them takes both junk and spicy foods. According to their survey of 127 young females, total 14 took junk foods, 8 are taking vegetarian food, 19 are taking spicy foods, 77 females taking all type foods, 3 are taking both vegetable and junk foods, and 6 taking both junk and spicy foods.

On the basis of available data we plan to develop a report and statistical analysis about the hormonal imbalance in young Female due to change in life style.

2. Menstrual Cycle and Hormonal Imbalance:

Several factors are responsible to disrupt hormonal balance and a normal menstrual cycle. Different drugs and contraceptive pills, stress and many other conditions are responsible for this. Usage of drugs, alcohol, caffeine and improper nutrition seems to physically change the proteins in the brain. By this, they can no longer send the proper signals for normal ovulation. Other factors which can disrupt hormonal exhaustion are eating disorders, ovulation disorder, polycystic ovary syndrome (PCOS) and abnormal cervical muscles.

3. Material and Methods:

A random sampling method was used in data collection from the female of age group 15-45 years. Data was collected in the month of September (2016 and 2017) during a *Health Check-up Camp* at *Institute of Home Science, Khandari, Agra*. Around 300 female of 15-45 age groups attended the camp and the data was collected randomly selected 200 females. A specially designed questionnaire was used for data collection and analysed. Different questions were asked to collect the data. Questions were specially designed to know about food habits intake of antibiotic and HRT, and special condition like depression and workload. from different medications especially antibiotic and other different causative factors like depression and workload on the hormonal imbalance showing as irregular periods and hair growth.

4. Data and its Analysis

We have used three tables for representation and analysis of data explicitly:

Table 1: Hormonal disturbance in female because of food intake type.

Hormonal Disturbance	Food Intake Type						Total
	Veg.	Spicy	Junk	Veg.+Junk	Junk+Spicy	All	
Irregular period	15	7	10	56	3	9	100
Hair growth	8	8	16	40	2	2	76
Both	5	1	6	5	3	4	24
Total	28	16	32	101	8	15	200

The correlation between irregular period and abnormal hair growth is 0.945 when we obtain the data for hormonal disturbance in female because of food intake type like vegetarian, spicy and junk food.

Table 2: Relationship between hormonal disturbances and different treatments

Hormonal Disturbance	Treatment				
	No Treatment	Antibiotic	Hormonal	Both	Total
Irregular period	48	31	15	6	100
Hair growth	47	19	6	4	76
Both	10	9	4	1	24
Total	105	59	25	11	200

The correlation between irregular period and abnormal hair growth is 0.963 when we obtain the data for relationship between hormonal disturbances and different treatments like antibiotic, hormonal treatment.

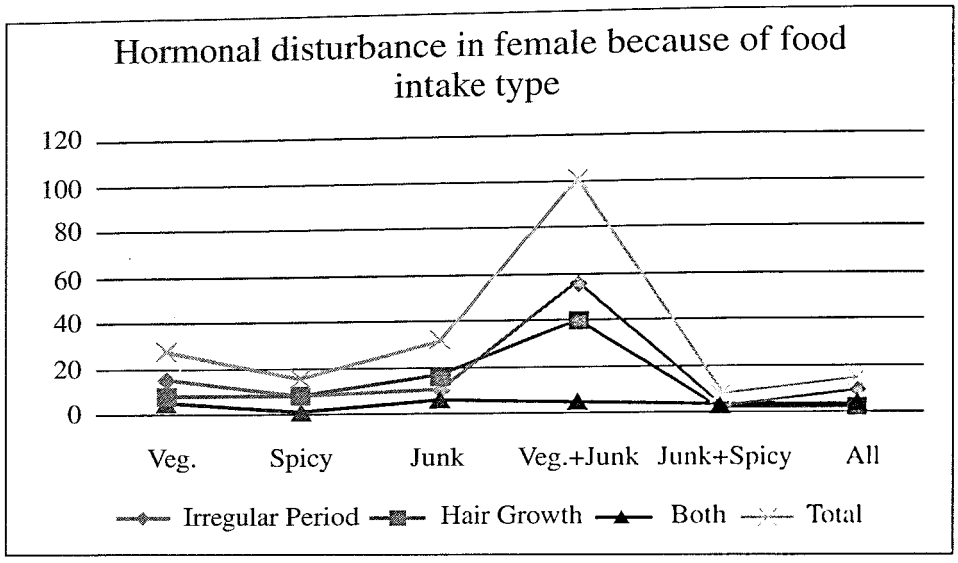
Table 3: Relationship between hormonal disturbances and different factors

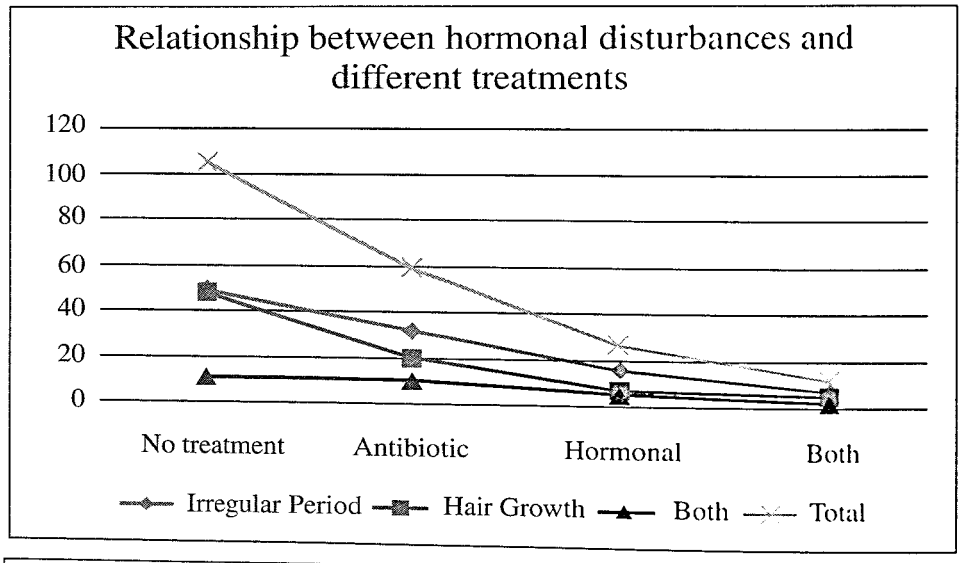
Hormonal Disturbance	Causative Factors				Total
	None	Depression	Workload	Both	
Irregular period	51	18	28	3	100
Hair growth	33	22	19	2	76
Both	7	11	5	1	24
Total	91	51	52	6	200

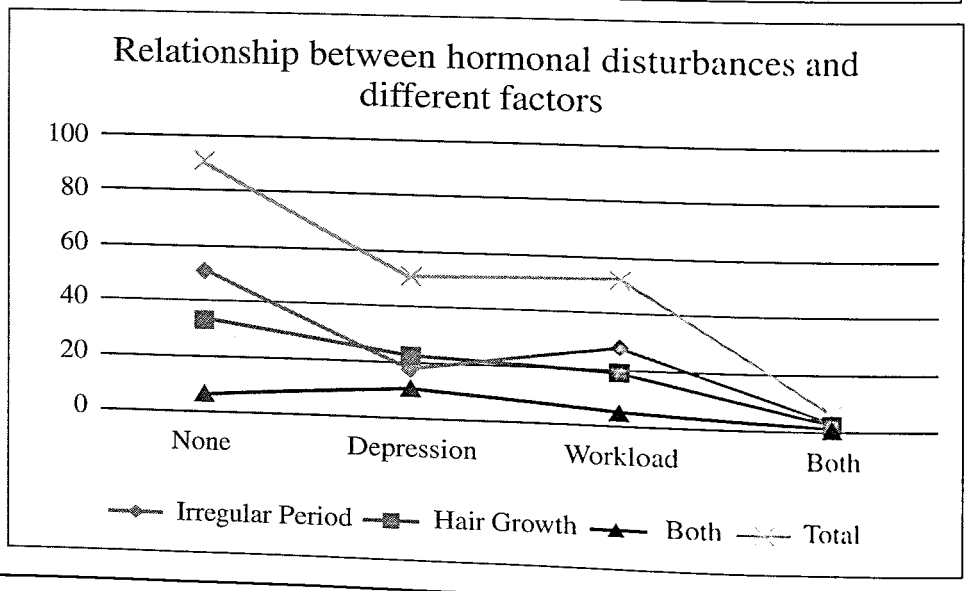
The correlation between irregular period and abnormal hair growth is 0.924 when we obtain the data for relationship between hormonal disturbances and different factors like depression, workload.

5. Result

Hormonal imbalances occur when there is too much or too little of a hormone in the bloodstream. Because of their essential role in the body, even small hormonal imbalances can cause side effects throughout the body. Therefore we design a questionnaire to observe the impact of different factors on hormonal disturbances on female.

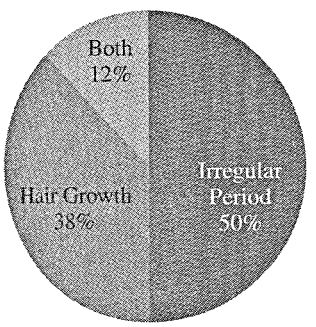

Hormonal disturbance in female because of food intake type
120
100
80
60
40
20
0
Veg.
Spicy
Junk
Veg.+Junk
Junk+Spicy
All
Irregular Period
Hair Growth
Both
Total


Relationship between hormonal disturbances and different treatments
120
100
80
60
40
20
0
No treatment
Antibiotic
Hormonal
Both
Irregular Period
Hair Growth
Both
Total


Relationship between hormonal disturbances and different factors
100
80
60
40
20
0
None
Depression
Workload
Both
Irregular Period
Hair Growth
Both
Total

According to our survey report about 50% young female of Agra city are suffering from irregular periods due to different reasons, whereas about 38% young female of Agra city facing abnormal hair growth due to different causes while 12% young female facing both problems i.e. irregular period and abnormal hair growth because of food intake, medication, depression, stress and workload etc.

Problems of Irregular period, abnormal hair growth and both



Here it is worth mentioning that while a hormone imbalance is a frustrating and difficult experience, there is help. Various treatments, including natural therapies, medication and lifestyle changes, may be successful in addressing hormonal imbalances. Perhaps the most common medical treatment of hormonal imbalance is the prescription of bio-identical or synthetic hormones.

This is known as hormone replacement therapy.

i) Bio-identical hormones (which can include estrogens, progesterone, DHEA, and testosterone) are derived from a natural substance.

ii) Synthetic hormones are created to mimic the effects of natural hormones.

iii) Both types of hormone replacement therapy can be very effective at restoring balance and resolving symptoms.

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FREE CONVECTION FLOW OF AN ELECTRICALLY CONDUCTING FLUID BETWEEN VERTICAL PARALLEL PLATES

PRAGATI SINGH, D.P. SINGH & SANJEEV KUMAR

ABSTRACT : This study deals with an unsteady viscous incompressible free convective flow of an electrically conducting fluid between two heated vertical parallel plates. This work is considered in the presence of induced plates and an induced magnetic field applied transversely to the flow. Assuming that the field along the lines of motion, varies transversely with the flow, and the fluid temperature changing with time. Analytical solutions for velocity, induced magnetic field and temperature distributions are obtained for small and large magnetic Reynolds numbers. The skin-friction on the two plates are obtained and plotted graphically.

KEY-WORDS: *Reynolds number, Hartmann number, induced magnetic field, skin friction, free convective flow.*

INTRODUCTION : Fluid is a substance whose constituent particles may continuously change their positions relative to one another when shear force is applied to it. As fluid flows, heat is transferred from one point to another. Heat transfer in fluids is called convection. Fluids do not exist in isolation but with solids. Fluids flowing in engineering devices occur within magnetic field. Fluid flow in the presence a magnetic field is called hydro magnetic flow and the study of hydro magnetic flows is called Magneto Hydro Dynamics (MHD). The experimental and theoretical research on MHD flows is important to scientific and engineering fields. In particular the influence of a magnetic field on a viscous, incompressible flow of an electrically conducting fluid is encountered in engineering devices such as MHD generators, MHD fluid dynamos, flow meters, heat exchangers and pipes that connect system components.

In this work an unsteady fluid motion under the action of uniform magnetic field applied externally reduces of reduction of heat transfer and skin friction considerably. This process of reduction of heat transfer and skin-friction of the fluid motion has various engineering applications such as nuclear reactor, power transformation etc. As far as the research work done in this direction then Borkakati and Srivastava (1976) investigated about the free and forced convection MHD fluid flow. In this work the variation of temperature causes variation density. This turn raises force of Buoyancy which governs the fluid motion. Elbashhbeshy (1996) studied about the heat and mass transfer in the same problem, in the presence of variable transverse magnetic field. Further Takhur et al (1996) have considered the effect of radiation on free convection flow along semi-infinite vertical plate in presence of transverse magnetic field. The unsteady problem in a channel was studied numerically by Attia (1999) with temperature dependence viscosity. He also considered steady state solution for velocity and temperature. In his study he analyzed the effect of viscosity parameter defined as ratio of viscosity of the fluid at two different temperatures. Further an unsteady magneto- hydrodynamic flow of heat transfer problem of dusty fluid between two parallel plates with variable physical properties was also discussed by Attia (2002). While the nature and

Pragati Singh
Greater Noida, UP
pragatisingh1100@gmail.com

D. P. Singh
Department of Mathematics
RBS College, Agra

Sanjeev Kumar
Department of Mathematics
Institute of Basic Science
Dr. Bhimrao Ambedkar University, Agra

behaviour of a viscous incompressible electrically conducting of a viscous incompressible electrically conducting fluid over a flat plate which is moving with a uniform speed in a quiescent fluid and in the presence of uniform magnetic field has discussed by Borkakati and Chakraborty (2002). In their conclusion they have found that for an incompressible fluid, both the fluid velocity and temperature gradually decreases with the increase of viscosity parameter. Singhla (2008) investigated the effect of heat transfer plate channel of an electrically conducting, viscous, incompressible fluid. He found that velocity distribution increases near the plate and then decreases very slowly at the central portion between two plates. Recently Kumar (2013) worked on a mathematical model of power law fluid with an application of blood flow through an artery with stenosis. The principal numerical result presented in his work showed that the flow field is appreciably influenced by the applied magnetic field.

In the present investigation, the fully developed free convection laminar flow of an incompressible viscous electrically conducting fluid between two vertical parallel plates in the presence of a uniform induced magnetic field applied transversely to the flow is considered. This induces a field along the lines of motion which varies transversely to the flow. The temperature of the fluid motion is assumed to be changing with time. The analytical solutions for velocity, induced magnetic field and temperature distribution are obtained for small and large magnetic Reynolds number R_m. The skin-friction at two plates are obtained for different magnetic field parameters and plotted graphically. The rates of heat transfer are also obtained and are plotted graphically.

FORMULATION OF THE PROBLEM

Consider an unsteady laminar free convection flow of a viscous incompressible electrically conducting fluid between two vertical parallel plates. Let x-axis be taken along vertical upward direction through the central line of channel and y-axis is taken as perpendicular to x-axis. The plate of channel are y = ± h. The uniform magnetic field $\overline{B_d}$ is applied parallel to y-axis and the induced field so produced is along x-axis that various along y-axis. The velocity and magnetic field distribution are $\vec{v} = [u(y),0,0]$ and $\overline{B} = [By, B_0, 0]$ respectively. Here B_0 and B_y are applied and induced magnetic field respectively. In order to derive the governing equations of the problem the following assumption are made.

The fluid is finitely conducting and the viscous dissipation and the joule heat are neglected. Hall effect and polarization effect are negligible. Initially the plates and the fluid are zero temperature and there is no flow within the channel. Further at time $t > 0$, the temperature of the plate $(y = \pm h)$ change according to $T = T_0 (1 - e^{-nt})$, where T_0 is constant temperature and $n \geq 0$ is a real number. The plates are considered to be infinite and all the physical quantities are functions of y and t only.

Under the above assumptions the non-dimensional governing equations for the present problem are:

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial y^2} + \left\{\frac{R_a}{P_r R_e}\right\}\overline{T} + \left\{\frac{M_0}{R_e R_m P_r}\right\}\frac{\partial b}{\partial y} \qquad (1)$$

$$\frac{\partial b}{\partial t} - R_e \frac{\partial u}{\partial y} - \left\{\frac{1}{R_m P_r}\right\}\frac{\partial^2 b}{\partial y^2} \qquad (2)$$

$$\frac{\partial \overline{T}}{\partial t} = \frac{1}{P_r}\frac{\partial^2 \overline{T}}{\partial y^2} \qquad (3)$$

The following non-dimensional term are-

$$t^* = \frac{\upsilon t}{h^2}, \quad b = \frac{B}{B_0}, \quad y^* = \frac{y}{h}, \quad \overline{T} = \frac{(T_0 - T)}{T_0} \qquad (4)$$

The asterisks have been dropped with the understanding that all the quantities are now dimensionless, where:

$M = \sqrt{\frac{(B_0^2 h^2 \sigma)}{\rho \upsilon}}$ -Hartmann number , $P_r = \frac{\upsilon}{\alpha_1}$ - Prandtl number, $R_e = \frac{u_0 h}{\upsilon}$ -Reynolds number,

$R_a = \frac{\beta g h^3 T_0}{\upsilon \alpha_1}$ -Raleigh number, $R_m = \alpha_1 \mu_e \sigma$ - Magnetic Reynolds number, $\alpha_1 = \frac{k}{\rho C_p}$, Thermal diffusivity

k -thermal conductivity , $V_e = \frac{1}{\sigma \mu_e}$ - Magnetic diffusivity, $\upsilon = \frac{\mu}{\rho}$ - Kinetic viscosity

σ-Electrical conductivity, r -Fluid density, m_e- Permeability of the medium, m -Co-efficient of viscosity.

The non-dimensional boundary condition reduced to –

t=0, u=0, b=1, T=1 at y=±h

t>0, u=1, b=B'/B_0, T=e^{-nt} at y=±h (5)

SOLUTION OF THE PROBLEM

Using boundary condition (5) to solve equations (1) to (3). We apply the transformation of variable.

$u=f(y)e^{-nt}$, $b=g(y)e^{-nt}$, $T=\phi(y)e^{-nt}$ $=\phi(y)e^{-nt}$ (6)

Substute these values of (6) in (1) (2) and (3) are reduce to

$$\frac{\partial^2 f}{\partial y^2} + \left\{\frac{R_a}{P_r R_e}\right\}\phi + \left\{\frac{M^2}{R_e R_m P_r}\right\}\frac{\partial g}{\partial y} + nf = 0 \quad (7)$$

$$\frac{\partial^2 g}{\partial y^2} + (R_e R_m P_r)\frac{\partial f}{\partial y} + (nR_m P_r)g = 0 \quad (8)$$

$$\frac{\partial^2 \phi}{\partial y^2} + (nP_r)\phi = 0 \quad (9)$$

The corresponding boundary are reduce to

$$\left.\begin{array}{llllll} for\ t=0, & f=0, & g=1, & \phi=1 & at & y=\pm 1 \\ for\ t>0, & f=e^{nt}, & g=\left(\frac{B}{B_0}\right)e^{nt} & \phi=1 & at & y=\pm 1 \end{array}\right\} \quad (10)$$

After using (10) equation (7) to (9) are reduce to

$$\phi(y) = \frac{\cos(ay)}{\cos a} \quad (11)$$

$f(y) = C_1\{\cosh(ay) - \sinh(ay)\} + C_2\{\cosh(ay) + \sinh(ay)\}$

$+ C_3\{\cosh(by) - \sinh(by)\} + C_4\{\cosh(by) + \sinh(by)\} - a_8\cos(ay)$ (12)

$$g(y) = C_5 \sin\left(y\sqrt{a_3}\right) + C_6 \cos\left(y\sqrt{a_3}\right) + \frac{1}{a_9}[a_4\{a\sin(ay)\}]\{(\alpha_2 + a_3)(\beta^2 + a_3)\}a_8$$
$$+ (a^2 - a_3)[\alpha\{\cosh(\alpha y) - \sinh(\alpha y)\}](\beta^2 + a_3) \quad [C_1 - \{\cosh(2\alpha y) + \sinh(2\alpha y)\}C_2]$$
$$+ \beta\{\cosh(\beta y) - \sinh(\beta y)\}(\alpha^2 + a_3) \quad [C_1 - \beta\{\cosh(\beta y) + \sinh(\beta y)\}C_2](\alpha^2 + a_3)$$
$$+ [C_3 - \beta\{\cosh(\beta y) + \sinh(\beta y)\}(\alpha^2 + a_3)C_4] \quad (13)$$

where,

$$a=\sqrt{nP_r},\qquad a_1=\frac{R_a}{R_eP_r},\qquad a_2=\frac{M^2}{(R_eR_mP_r)}$$

$$a_3=nR_mP_r,\qquad a_4=R_eR_mP_r,\qquad a_5=a_1\sec a,$$

$$a_6=n+a_3-a_2a_4,\qquad a_7=(a^3-a^2)a_5\qquad a_5=a_1\sec a,$$

$$a_8=\frac{a_7}{(a_4+na_3-a^2a_6)},\qquad \alpha=\frac{\left\{\sqrt{-a_6-\sqrt{-4na_3+a_6^2}}\right\}}{\sqrt{2}}$$

$$\beta=\frac{\left\{\sqrt{-a_6-\sqrt{-4na_3+a_6^2}}\right\}}{\sqrt{2}},\quad a_9=(a^2-a_3)(\alpha^2+a_3)(\beta^2+a_3)$$

$$C_1=-\frac{\cos a\left[a_7-\left\{-a^4+\beta^4+(a^2+\beta^2)a_6\right\}a_8\right]}{2\cosh\alpha(\alpha^2-\beta^2)(\alpha^2+\beta^2+a_6)}$$

$$C_2=-\frac{\cos a\left[a_7+\left\{-a^4+\beta^4+(a^2+\beta^2)a_6\right\}a_8\right]}{2\cosh\alpha(\alpha^2-\beta^2)(\alpha^2+\beta^2+a_6)}$$

$$C_3=-\frac{\cos a\left[a_7+\left\{-a^4+\alpha^4+(a^2+\alpha^2)a_6\right\}a_8\right]}{2\cosh\beta(\alpha^2-\beta^2)(\alpha^2+\beta^2+a_6)}$$

$$C_4=-\frac{\cos a\left[a_7+\left\{-a^4+\alpha^4+(a^2+\alpha^2)a_6\right\}a_8\right]}{2\cosh\beta(\alpha^2-\beta^2)(\alpha^2+\beta^2+a_6)}$$

$$C_5=-\left[\operatorname{cosec}\left(\sqrt{a_3}\right)a_4\left\{a\sinh(\alpha^2+a_3)(\beta^2+a_3)a_8+(a^2-a_3)\right.\right.$$
$$\left.\left.-\alpha\sinh\alpha(\beta^2+a_3)(C_1+C_2)-\beta\sinh\beta(\alpha^2+a_3)(C_3+C_4)\right\}\right]$$

$$C_6=-\frac{1}{2a_9}\operatorname{sec}\left(\sqrt{a_3}\right)\left[2(a_2-a_3)a_4\left\{\alpha\cosh(\beta^2+a_3)(C_1+C_2)\right.\right.$$
$$\left.\left.+\cosh\beta(\alpha^2+a_3)(C_3+C_4)\right\}-2a_9\right]$$

SKIN FRICTION

The skin friction coefficient (r) at the plate y = ±1 is defined as

$$\tau=-\left[\mu\frac{du}{dy}\right]_{\pm1} \tag{14}$$

The non-dimensional skin friction after removing the asterisks takes the form

$$\tau=-\left[\frac{\mu\beta gT_0h}{\upsilon}\right]\left[\mu\frac{du}{dy}\right]_{\pm1} \tag{15}$$

Using (12) we get

$$\tau=-\left[\frac{\mu\beta gT_0h}{\upsilon}\right]\left[\frac{du}{dy}e^{-nt}\right]_{y=\pm1} \tag{16}$$

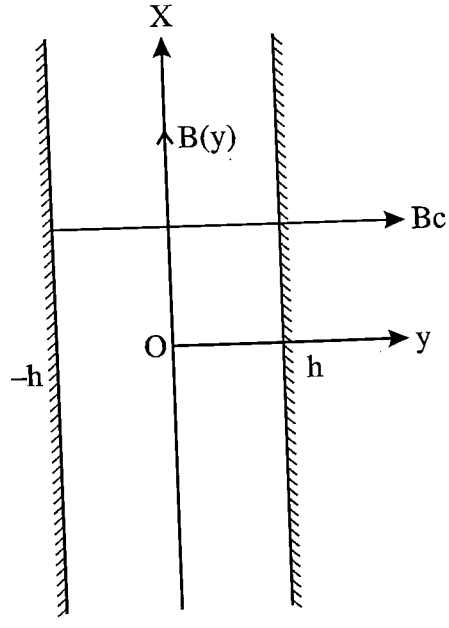

Fig. 1: Physical Model

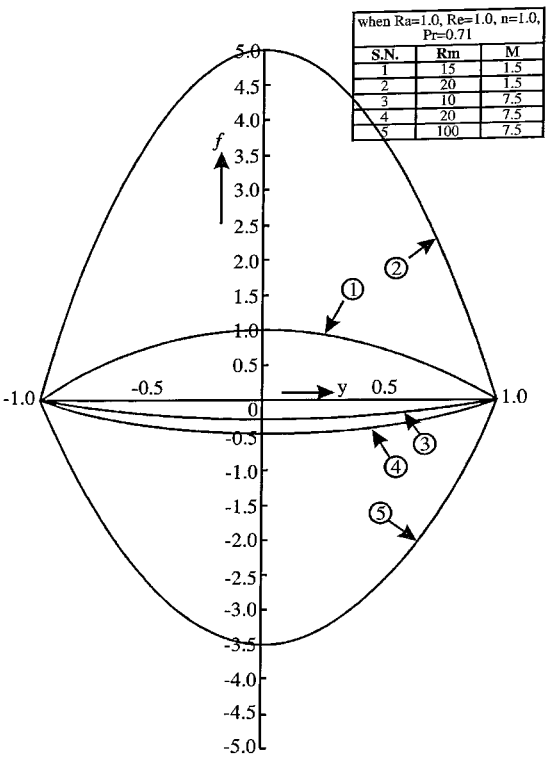

Fig. 2: Volocity Profile for large R_m

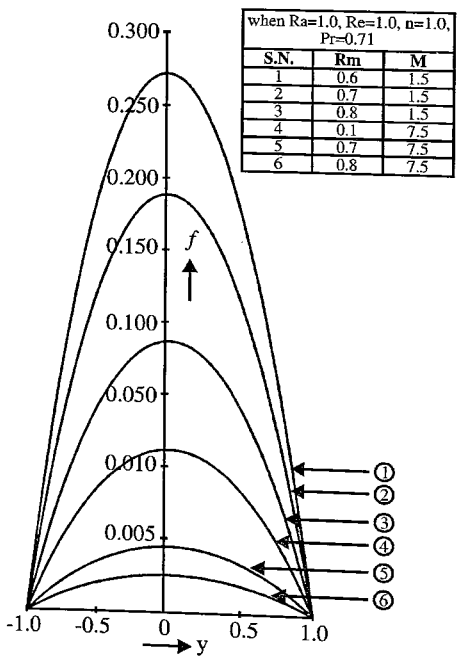

Fig. 3: Volocity Profile for Small R_m

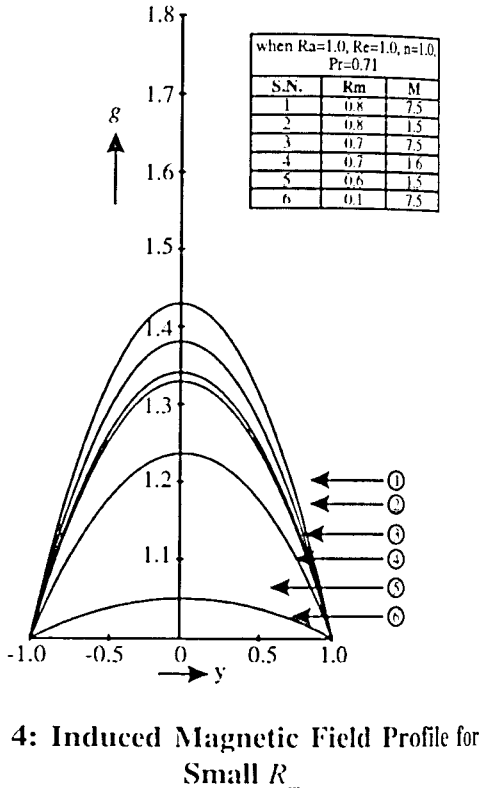

Fig. 4: Induced Magnetic Field Profile for Small R_m

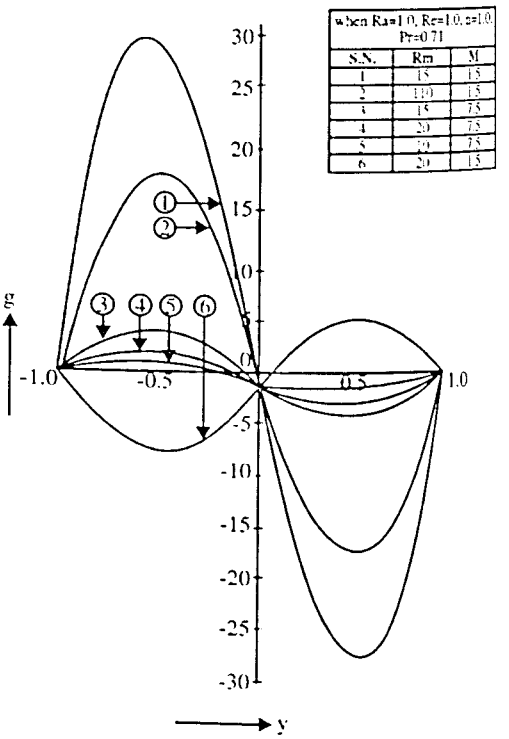

Fig. 5: Induced Magnetic Field Profile for Large R_m

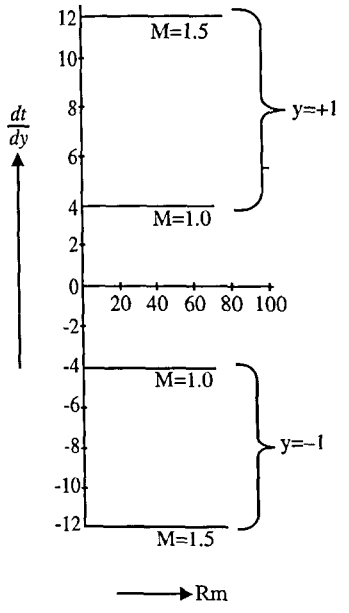

Fig. 6: Variation of Skin-Friction Factor

RESULT AND DISCUSSION

The velocity profile f against the distance from the fixed plate y is plotted at different value of magnetic Hartmann number (M) for small and large magnetic Reynolds number (R_m) in the fig. (2) and (3).

We observed that the velocity at the control plane of the channel is maximum but opposite in direction. In fig (3) it is observed that the velocity gradually decrease with the increase' of magnetic Reynolds number (R_m). In fig (4) and (5) the induced magnetic field strength are plotted against distance from the plates at point equal distance from the plates and at point on the plates. The effect of M and R_m on the skin friction first increases the gradually decreases with the increase of M which is shown in Fig. (6).

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MEASURING THE ANTAGONISTIC POTENTIAL OF SOME COMMERCIAL PROBIOTIC PRODUCTS AGAINST *ESCHERCHIA COIL*

JAGRITI SHARMA & ANKUR GOYAL

ABSTRACT : Probotics, are known put numerous health benefits on human beings. Their antagonistic potential is perhaps the most important health benefit conferred by them. The present study deals with determination of their antagonistic potential against the standard and clinical isolates of *Escherchia coli*. For this, the probotic strains were isolated from the commercial probotic products and tested for their antimicrobial activity against the *Escherchia coli* by using the agar overlay method. A considerable amount of antimicrobial activity was noticed by the strains isolated from the probotic products under the commercial tag, Yakult, enterogermina, G Norm, Norgut and Nutro B Plus.

KEY WORDS: (Probiotics, Antagonism, *Escherchia coli*)

INTRODUCTION

Probiotics are commonly defined as a cultures of live microbes that when given to a human or animal, imposes beneficial effects on the health of host by improving the balance of the indigenous micro organisms. Many studies have shown that probiotics can decrease diarrheal incidence, alleviate lactose intolerance, stimulate the immune system, decrease serum cholesterol, control infections and can act as antibiotics, suppress tumors and protect against colon/ bladder cancer (Scheinbach, 1998).

Jagriti Sharma
Department of Microbiology,
School of Life Science
Dr. Bhimrao Ambedkar University, Agra

Ankur Goyal
Department of Microbiology
S.N. Medical College, Agra

The orally ingested non indigenous bacteria i.e. Probiotics affect the host by three basic mechanisms; competition for adhesion sites, immunomodulation and by secreting antimicrobial compounds which inhibit the growth of pathogens (Fuller, 1991). The present study was designed to determine the antimicrobial activities in the commercial Probiotic products against the standard and clinical samples of *Escherchia coli.*

MATERIALS AND METHODS

Probiotic strains:

Commercial Probiotic products Yakult, enterogermina, G Norm, Norgut and Nutro B Plus were taken to isolate their content probotic microorganisms. As per the product information, Yacult was having *Lactobacillus casei* while *Sacchraomyces boulardii* and *Bacillus clausii* were isolated from the "G Norm" and "enterogermina" respectively. Norgut and Nutro B plus were found to contain *Streptococcus thermophilus* and Lactic acid bacilli.

Isolation of probiotic strains:

To isolate the *L.casei* from yakult, a loopful of yakult suspension was inoculated on MRS agar media and kept at 37°C in a Mc Intosch jar. After 48 hrs, the pale whitish colonies appeared on the plates. To isolate the *Sacchraomyces boulardii* a pinch of powder from the ''G Norm", capsule was dissolved in 2 ml of water and the suspension was inoculated on the sabouraud dextrose agar medium and kept at 37°C for 24 hr. Now the colonies were further sub cultured to get the pure colonies. To isolate the *B. clausii* from ''enterogermina", a loopful of enterogermina suspension was inoculated on Nutrient agar surface and kept at 37°C for 24 hrs. The pale whitish colonies

appeared on the plates after 24 hrs,. These pure colonies were stored at 4°C in the butt slant tubes of nutrient agar. Similarly Norgut and Nutrolin B Plus were suspended in saline and isolated on MRS using Mc Intosch jar at 37°c for 24

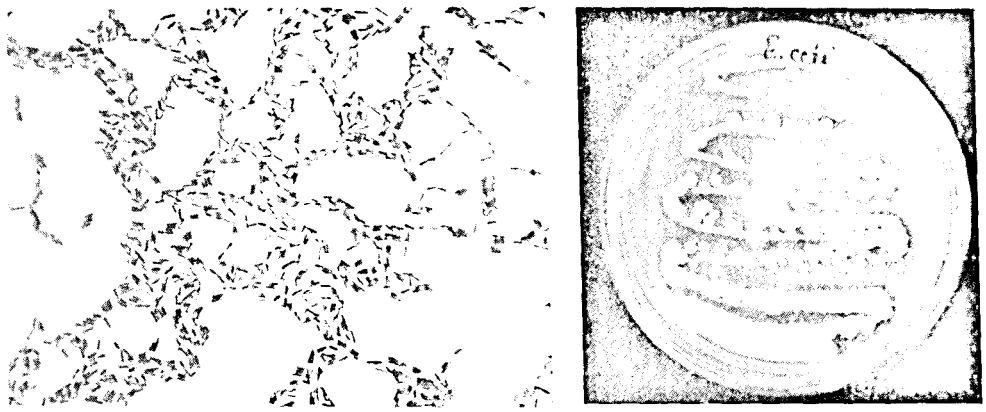

Fig.1:(a) *Bacillus clausii* as seen under light microscope (100 X) (b) *Escherichia coli* (MTCC-443)

Table 1: Isolation of probiotic strains.

Commercial Product	Product Content	Isolated micro-organism
Yakult	Live *Lactobacillus casei* Shirota strain, 6.5 billion per 65 ml bottle	*Lactobacillus casei*
Enterogermina	Spores of poly antibiotic resistant *Bacillus clausii* (2 billion/5ml oral suspension)	*Bacillus Clausii*
G Norm	*Sacchromyces boulardii (lyophilized)*	*Sacchromyces boulardii*
Norgut	Bifidobacterium Bifidum, Lactic Acid Bacillus & Streptococcus Thermophilus	*Streptococcus Thermophilus*
Nutrolin-B Plus	Lactic Acid Bacillus & Folic acid	Lactic Acid Bacillus

Collection and maintenance of *Escherchia coli* strains

The standard strains of the *Escherchia coli* MTCC-443, MTCC723 and MTCC-729, were obtained from IMTECH, Chandigarh India and clinical strain was received from the SN Medical College Agra. The isolated clinical strain of *Escherchia coli* was confirmed by microscopic examination and by biochemical test. All the strains were stored in Brain Heart Infusion Agar (BHIA) butt-slants in screw-capped tubes at 4°C.

Determination of Antimicrobial Activities

The modified agar overlay method was used to test the antagonistic potential of the probiotic isolates. The probotic strains from the stock cultures were inoculated into brain heart infusion broth (BHIB). The turbidity of the broth culture was adjusted to that of #1 MacFarland standard. This suspension was called as probotic culture. The strains of *Escherchia coli* from the stock cultures were sub cultured in BHIB under aerobic condition at 37°C for 24 hrs. The turbidity of the cultures was adjusted to that of #0.5 McFarland standard. Now the culture was used as the pathogen culture. The prepared probiotic cultures were individually inoculated into the plates by swabbing a 1 inch by 1.5-inch area in the center of each plate. The plates were incubated anaerobically, at 37°C for 24 hours .The growth in each plate was then overlaid with 10 ml of molten and cooled brain heart infusion agar (BHIA) previously inoculated with 1 ml of the prepared pathogen cultures. The agar was allowed to solidify and the plates were incubated aerobically at 37°C for 24 hours. The plates were then examined for the presence of growth inhibition.

RESULTS AND DISCUSSION

Isolation and Cultivation of Probiotics

Different Probotic products Yakult , enterogermina, Norgut and Nutro B Plus, were isolated on De Man and Sharp Agar (MRS) while the product from G Norm was inoculated on sabouraud's dextrose agar. The isolates from Yakult and Nutro B plus produced yellowish, convex, round and moist colonies. Gram-positive bacilli in pairs or chains, consistent with the morphology of *Lactobacillus casei*, were seen under the microscope in Yakult. The isolates from Norgut were shown to produce cream colored, round, smooth, convex and moist colonies. Gram stain results showed that isolates were gram positive, non-sporeforming cocci that occurred in chains consistent with the microscopic morphology of *Streptococcus thermophilus*. The probiotics obtained from enterogermina were cultured in MRS which produced colonies that were small, round, smooth, convex, white and moist. The Gram stained smears showed both gram-positive cocci in pairs or long chains, and gram-positive, spore forming bacilli occurring singly, in short chains were identified as *Bacillus clausii* and *Lactobacillus sporogenesis*. The strain from GNorm was isolated in form of white yellowish colonies on sabouraud's dextrose agar and characteristic pink spores were seen after AFB staining.

Determination of antimicrobial activity

Almost all of the probiotic strains from the probiotic products were found to inhibit the growth of both standard as well as the clinical isolates of *Escherchia coli* (Table 1) with varied spectrum of their antimicrobial activities. Yakult, and Nutro B Plus probiotics inhibited the growth of all the strains tested against them. G Norm was ineffective against the MTCC 723 and clinical strain but effective against the MTCC 443 and MTCC 729 strain of *Escherchia coli* . Enterogermina, probiotics were inhibitory for *Escherchia coli* MTCC 443 and MTCC 729. Norgut probiotics although killed the *Escherchia coli* MTCC 443 and MTCC 723 strains but stayed ineffective against MTCC-729&CLINICAL isolate.

Table no. 2. Results of the Antimicrobial Assays of the probotic strains isolated from different commercial Probiotics Products.

	Yakult	G Norm	E.Germ	Norgut	Nutro. B plus
E.coli. MTCC-443	+	+	+	+	+
E.coli. MTCC-723	+	NA	NA	+	+
E.coli. MTCC-729	+	+	+	NA	+
E.coli. Clinical	+	NA	NA	NA	+

CONCLUSION

The potential of probotic products, Yakult , enterogermina, Norgut and Nutro B Plus to inhibit the growth of pathogens ensure the health benefits conferred by these products. These products seem to be useful in protection from systemic and enteric infections (Mc Donagh et al., 1999). Lactobacilli are known to produce many types of bacteriocins like acidophilin acidolin, lactocidin, lactobrevin (Alvarez-Olmos and Oberhelman, 2001; Sarika et al., 2010).There the studies which supports potentiating of antagonistic activity of the antibiotics by probitics (Sharma and Chauhan , 2015; Sharma and Chauhan , 2015). Occurrence of antimicrobial activity in these products may be helpful in establishing them as a supplementary therapeutic agent if not an alternate to the antibiotic therapy against the *Escherchia coli.*

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