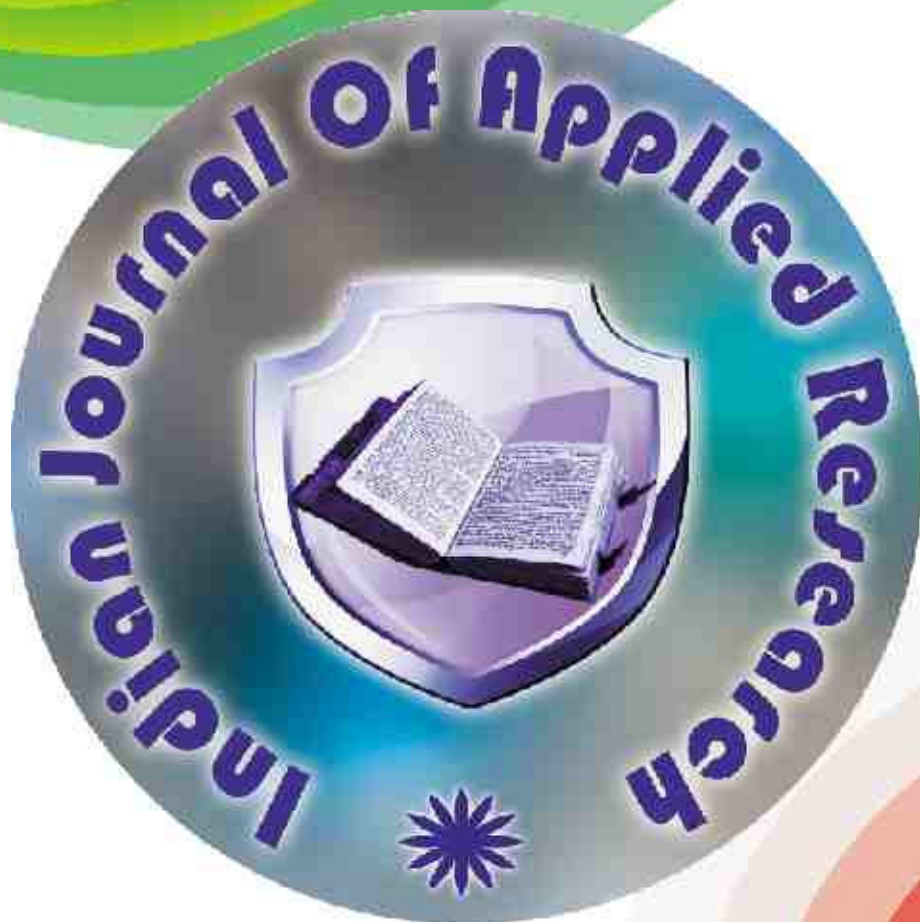


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INDEX

Sr. No	Title	Author	Subject	Page. No.
1.	Statistical Optimization Of Ferulic Acid Esterase Production In Aspergillus Niger Isolate Using Response Surface Methodology	Balljinder Kaur , Neena Garg	Biotechnology	1-6
2.	Development Of Forest Area In Tropics: The Urgency Of People's Participation In The Indian Context	Dr. M. P. Naik	Commerce	7-8
3.	Opportunity For International Corporations At Bop Segments Of Emerging Markets (Focus : India)	Bhudhar Ranjan Chatterjee , Sukanya Chatterjee.	Commerce	9-11
4.	Retail Trade	Viram. J. Vala , Dr. (Prof.) Vijay Kumar Soni	Commerce	12-15
5.	Determinants Of Market Value Added Some Empirical Evidence From Indian Automobile Industry	Dr. A. Vijayakumar	Commerce	16-20
6.	The Welfare Facilities Available To The Workers In Paper Mills In Madurai	Dr. M. Sumathy , A. Vijayalekshmi	Commerce	21-24
7.	Green Marketing - New Hopes And Challenges	Dr. Prashant M. Joshi	Commerce	25-27
8.	A Study On Employee Welfare Measures In Maharashtra State Transport Corporation With Special Reference To Kolhapur District.	Dr. H. M. Thakar , Prof. Urmila Kisan Dubal	Commerce	28-30
9.	Business Environment In South Korea An International Perspective	Dr. M. Kamalun Nabi , Dr. M. Saeed	Commerce	31-35
10.	Market Timing - Implications Of Market Valuation On Share Issues By Indian Companies	L. Ganesamoorthy , Dr. H. Shankar	Commerce	36-38
11.	The Conceptual Framework Of Corporate Social Accounting	Rechanna , Dr. B. Mahadevappa	Commerce	39-50
12.	Labour Welfare Measures And The Extent Of Satisfaction Of Tirupur Garment Employees	Mr. S. Hariharan , Mr. N. Selvakumar, Dr .H. Balakrishnan	Commerce	51-53
13.	Mahila Savstha Aur Jacha-Bacha Ko Bachane Ko Chunoti	Dr. Anup Chaturvedi	Community Science	54-55
14.	Mapping Of Existing Waste Dumping Sites And Newly Proposed Waste Dumping Sites In And Around Chitradurga Taluk, Karnataka State, Using Remote Sensing And GIS Techniques.	Sunil Kumar R. K Chinnaiiah , Suresh Kumar B.V	Earth Science	56-58
15.	A Role Of Municipal Council And Corporation Of Financial Problems In Nanded District (Maharashtra)	Dr. A. S. Pawar	Economics	59
16.	Impact Of Institutional Credit On Weaker Section In Akola District	Dr. Devyanee K Nemade, Dr. Vanita K Khobarkar	Economics	60-62
17.	Right To Education In India	Dr. Pawar A. S.	Economics	63-65
18.	Gramin Ayam Adivasi Mahilo Ke Arthik Shakti : Sukhma Virti (Adipur Jila Ke Gramin Ayam Adivasi Mahilao Ka Ek Ayaktik Adhiyan Shobha Gupta	Shobha Gupta	Economics	66-67

19.	Knowledge On Food Security Education Among Higher Secondary Students	Dr. P. Paul Devanesan , Dr. A. Selvan	Education	68-69
20.	Family Environment As A Determinant of Academic Anxiety And Academic Achievement	Dr. RajKumari Kalra , Ms. Preeti Manani	Education	70-71
21.	Awareness On Man-Made Disaster In Environmental Education Among High School Students	Dr. A. Selvan , Dr. P. Paul Devanesan	Education	72-73
22.	Teaching Strategies For Simplifying Fractions In Mathematics	M. Kavitha , Dr. A R. Saravanakumar	Education	74-76
23.	Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGA): A Boon to Tribal Women	Dr. Sherly Thomas	Education	77-78
24.	Sports as a Tool for Interest Oriented Learning	E. Baby Sumanna	Education	79-80
25.	Balanced Scorecard for Higher Education	Jyoti D Joshi	Education	81-83
26.	A Study Of The Interactive Influence Of CAI Package On Academic Achievement	Kunal D. Jadhav	Education	84-85
27.	Reduction Of Fault Current Using SFCL At The Suitable Location In The Smartgrid	Pudi Sekhar , K .Venkateswara Rao , M. Ebraheem , P. Nageswara Rao	Electronics	86-88
28.	HRD Climate in Private Manufacturing Sector: An Appraisal	Dr. Sukhwinder Singh Jolly	Engineering	89-90
29.	Wireless Speed Measurement And Control Of Universal Motor	G. Prasad , G. Ramya Swathi, Dr. P. V. N. Prasad , A. Muneiah	Engineering	91-94
30.	Design Of Decentralized Load-Frequency Controller For Deregulated Hydro-Thermal Power Systems With Non-Linearities	M. Vinothkumar , Dr. C. Kumar , Dr. S. Velusami	Engineering	95-99
31.	Optimization Of Process Parameters For Gas Tungsten Arc Welding Aluminum Alloy A6061 By Taguchi Method	P. Hema , K. Allama Prabhu , Prof. K. Ravindranath	Engineering	100-103
32.	Numerical Approach To Predict The Thermal Performance Of Parallel And Counter Flow Packed Bed Solar Air Heaters	Satyender Singha , Prashant Dhiman , Ritika Kondal	Engineering	104-108
33.	Institute For Entrepreneurship Development Amongst Farmers- Especially Small And Marginal Land Holders.	Sweta Sanjog Metha	Entrepreneurship Development	109-111
34.	Phytoplankton Diversity From Godavari River Water (Maharashtra)	Satish.S.Patil , Ishwar.B.Ghorade	Environmental Science	11-114
35.	Nutrient Adequacy Among Selected Tribal Adolescent Girls Of Kattunayakan Tribes In Tamil Nadu	Somishon Keishing , Saranya .R	Home Science	115-116
36.	Vaigyanic Sacharata Aur Arthik- Samajik Vikas	Dr. Sudobh Kumar	Humanities	117-118
37.	E-Pharmacy In India For Reducing Inter-State Accessibility Dispersion	Satinder Bhatia	Information Technology	119-121
38.	Impact Of Intermediaries' Service Delivery In Insurance Sector	Dr. P. Anbuoli , R. Meikanda Ganesh Kumar	Insurance Sector	122-124

39.	Fate And Human Endeavour In The Mahabharata	Dr Maneeta Kahlon	Literature	125-127
40.	Facets of Hunger in Bhabani Bhattacharya's So Many Hungers and Kamala Markandaya's Nectar in a Sieve	Dr. Paramleen Kaur Syali , Ruchee Aggarwal	Literature	128-129
41.	Business Financial Strategy In Small And Medium Scale Brick Industries In Kolar District, Karnataka State.	Muninarayanappa , Dr. S. Muralidhar	Management	130-132
42.	A Study On Brand Equity Analysis Foreign Global Brands Vs Domestic Popular Brands Of Adult Consumer's Perspective In Coimbatore City	A.Pughazhendi , S. Susendiran , R. Thirunavukkarasu	Management	133-135
43.	Comparative Analysis of Cellular Phone Usage Outline of Undergraduate Students.	Atul Patel	Management	136-138
44.	A Study On Management Practices Of Entrepreneurs In Informal Sector	Dr. P. Vikkraman , Mr. S. Baskaran	Management	139-142
45.	E-commerce: Emerging Channel for Marketing in India	Dr Mahalaxmi Krishnan	Management	143-144
46.	The Role Of Educational Institutions In Imparting Entrepreneurship Qualities Among Student Community	Dr. N. Ramanjaneyalu	Management	145-147
47.	Impulsive buying and In-store shopping environment	Dr. Surekha Rana , Jyoti Tirthani	Management	148-149
48.	A Study On Management Practices Of Entrepreneurs In Informal Sector	Dr. P. Vikkraman , S. Baskaran	Management	150-153
49.	Risk Management Processes And Techniques For Resolving Customer - Supplier Relationship Issues	Pramod Kumar , Prof (Dr.) S.L.Gupta	Management	154-160
50.	Risk Management Processes & Techniques For The Successful Delivery Of Web Based Software Projects	Pramod Kumar , Prof (Dr.) S. L. Gupta	Management	161-166
51.	Effect Of Brand Equity On Consumer Purchasing Behaviour On Car: Evidence From Car Owners In Madurai District	R. Suganya	Management	167-169
52.	Relationship Management Model For Global It Industry.	Rishi Mohan Bhatnagar , Prof (Dr.) S. L. Gupta	Management	170-173
53.	It's A Myth That Kirana Stores Will Be Wiped Out If FDI Is Allowed In Multi Brand Retail Sector In India	Shweta Patel , M R Brahmachari	Management	174-176
54.	Learning Organization	Sitheswaran K , Dr. K. Balanaga Gurunathan	Management	177-178
55.	Behavior Management: A Ready-made Soup For Indian Managers	Winnie Jasraj Joshi	Management	179-180
56.	Customer Relationship Management In Public Sector Banks	Dr. P. Anbuoli , T. R. Thiruvén Kat Raj	Marketing	181-182
57.	Nifedipine Compared With Isoxuprine In Treatment Of Preterm Labor	Dr. Santosh Khajotia	Medical Science	183-184

58.	Single Intraoperative Dose of Tranexamic Acid In Orthopedic Surgery (A Study of Bipolar Modular Prosthesis and Dynamic Hip Screw fixation)	Dr. B. L. Khajotia , Dr. S. K. Agarwal, Dr. Prasant Gadwal	Medical Science	185-187
59.	MVA - A Simple & Safe Surgical Procedure For First Trimester Abortion / Medical Termination Of Pregnancy (MTP)	Dr. Priyamvada Shah , Dr. Sameer Darawade	Medical Science	188-190
60.	Pneumococcal Septic Arthritis in an Infant A Case Report	Dr. Vrishali A Muley , Dr. Dnyaneshwari P Ghadage, . Dr. Arvind V Bhore	Medical Science	191-192
61.	A Clear CSF may not be a Normal CSF A Case Report	Dr. Dnyaneshwari P Ghadage , Dr. Vrishali A. Muley , Dr. Arvind V. Bhore	Medical Science	193-194
62.	Neurectomy For Tic How Much Reliable?	Dr. Monali H. Ghodke , Dr. Seemit V. Shah , Dr. Smita A. Kamtane	Medical Science	195-198
63.	To Assess Acceptability Of Female Condom As A Method Of Temporary Contraception Among Indian Women	Dr Priyanka Shekhawat , Dr. Col (Retd) Gulab Singh, Dr Vidula Kulkarni Joshi	Medical Science	199-200
64.	A Study To Evaluate The Efficacy Of Teaching Intervention On Reduction Of Pediatric Immunization Pain Among Nursing Students	Dr. Ramachandra , Dr. S. Valliammal, Mr. Raja Sudhakar	Nursing	201-202
65.	Screening Of Antenatal Patients For Thalassemia	Dr Mukta Rayate , Dr Durga Karne , Dr Shilpa Bhat, Dr Hemant Damle , Dr Sameer Darawade, Varsha Gogavale	Obstetrics & Gynaecology	203-204
66.	Reservoir Rock Quality of the Lakadong Member in the Eastern Part of Upper Assam Basin, India	Dr. Pradip Borgohain	Petroleum Geology	205-207
67.	Study Of Refractive Index And Excess Parameters For Different Liquid Mixtures At Different Temperatures	Sheeraz Akbar , Mahendra Kumar	Physics	208-210
68.	Refractometric And Excess Parameter Study For Liquid Mixtures Containing High Order Alkanes (C17) And 1-alkanols At Different Temperatures	Sheeraz Akbar , Mahendra Kumar	Physics	211-213
69.	Assessment Of Knowledge About Health Services Available At Subcentre Level Among Village Inhabitants	Balpreet Singh , Jayanti Dutta	Public Health	214-215
70.	Effect Of Yogic, Aerobic And Laughter Exercises On Body Composition (An experimental study)	Dr. Manjappa. P. , Dr. Shivarama Reddy. M	Sports	216-220
71.	Age At Menarche In Physically Active And Non Active Urban Girls Of Patiala District	Jyoti Sharma , Dr. Ajita	Sports Science	221-222
72.	Use Of Ranks For Analysis Of Groups Of Experiments	Dr. Vanita K Khobarkar , Dr. S. W. Jahagirdar, Dr. N. A. Chaube	Statistics	223-225



A Clear CSF may not be a Normal CSF A Case Report

* Dr. Dnyaneshwari P Ghadage ** Dr. Vrishali A. Muley
*** Dr. Arvind V. Bhole

* Professor and Head, Department of Microbiology, Smt. Kashibai Navale Medical College and General Hospital, Pune

** Professor, Department of Microbiology, Smt. Kashibai Navale Medical College and General Hospital, Pune

*** Dean, Smt. Kashibai Navale Medical College and General Hospital, Pune

ABSTRACT

Cerebrospinal fluid with a normal cell count, glucose and protein values, and a negative Gram's stain smear is usually assumed to exclude the possibility of meningitis. We report a 7 month old male infant who presented with meningitis but with normal Cerebrospinal Fluid (CSF) findings. Streptococcus pneumoniae was later cultured from CSF. We conclude that an abnormal initial CSF study might indicate a diagnosis of bacterial meningitis but a normal result does not exclude it and should not delay early institution of appropriate antimicrobial therapy.

Keywords : CSF, normal findings, Streptococcus pneumoniae

Introduction

A normal result on the initial cerebrospinal fluid (CSF) study has been traditionally used to exclude the potential diagnosis of bacterial meningitis. However, there have been a number of case studies of bacterial meningitis confirmed by CSF culture, in which an initial lumbar puncture yielded completely normal parameters. A review of the literature reports the frequency of this scenario to arise in 0.5% to 12% of cases. This might result in the delay of appropriate treatment for this potentially fatal condition.[1] We report a 7 month old male infant who presented with a clinical picture compatible with bacterial meningitis but with a normal CSF result.

Case Report

A 7 month old male infant was admitted with a history of fever of 3 days duration and tonic clonic fits 8 hours prior to admission. There was no history of prior antibiotic administration. On examination, the child was febrile, fully conscious and irritable. Systemic examination did not reveal any abnormalities. There was no neck rigidity. Kernig's sign was negative. No papilledema detected on fundal examination. There were no neurological deficits. The hematological investigations revealed a hemoglobin of 10.6 gm%, total leukocyte count was 14600/ cu. mm. (N - 37%, L - 61%, E - 2%) and platelet count was 3.8 lakhs / cu. mm. C-reactive protein was negative. Serum electrolytes were within normal limits. Blood sugar was 92 mg / dl.

CSF examinations findings were as follows. CSF cytology: cells - nil, Gram stain - no microorganisms seen, CSF biochemistry: sugar - 62 mg / dl, proteins - 12 mg / dl and globulins- not increased. Blood and CSF culture revealed *Streptococcus pneumoniae* sensitive to amikacin, amoxicillin-clavulanic acid, penicillin, cefotaxime and vancomycin. Broad spectrum antibiotic therapy at meningitic doses was started on admission without waiting for culture reports because of strong clinical suspicion of meningitis. The antibiotics were continued for 12 days.

Discussion

Bacterial meningitis in childhood carries a high morbidity and mortality in developing countries. Outcome depends on early diagnosis and appropriate use of antibiotics.[2] Patients of meningitis usually present with signs and symptoms of meningeal inflammation like nausea, vomiting, irritability, anorexia, headache, confusion, back pain and nuchal rigidity. Laboratory findings of CSF from meningitis cases include pleocytosis and abnormal biochemistry values. Confirmation is by demonstration of microorganisms on Gram stain or by isolation of organism by CSF culture.[3] However, sensitivity of CSF study is not 100%. There are a number of case studies of bacterial meningitis confirmed by CSF culture, in which an initial lumbar puncture especially if performed early in the course of illness (within 24-36 hr) yielded completely normal parameters. Frequency of this scenario varies from 0.5% to 12% of cases.[1] Thus a single lumbar puncture does not rule out the meningitis.[4] Onorato et al [5] and Soskolne et al [4] have emphasized the importance of repeat lumbar puncture in these patients

One of the possibilities is that lumbar puncture in the presence of a bacteremia or septicemia could be responsible for the subsequent development of meningitis, the damaged meninges becoming a nidus for circulating organisms. The production of a defect in the meninges could allow a leak of blood into the CSF, thus seeding the CSF. It has been shown experimentally that 103 organisms per ml of blood are required at the time of cisternal puncture to produce meningitis. [4]

On the other hand, from long time, it has been reported that the incidence of meningitis in children who had a lumbar puncture during the course of a pneumococcal bacteremia was no greater than in bacteremic patients who did not undergo the procedure. [4]

Leukocyte recruitment is a key aspect of the host response against invading micro-organisms. In experimental pneumococcal meningitis blocking of leukocyte accumulation in the CSF augmented bacteremia and increased mortality due to severe sepsis.

Another study in animals with pneumococcal meningitis showed a relation among a large CSF bacterial load, lack of response of CSF leukocytes and intracranial complications. This suggests that low CSF WBC is related to excessive bacterial growth.[6] This phenomenon of hypo or acellular CSF has been observed in patients with sickle cell disease who develop pneumococcal meningitis or meningitis due to *Haemophilus influenzae* probably because of defective inflammatory response. [7] The absence of CSF pleocytosis could be attributed to the factors like age extremity, early infection, fulminant infection, prior antibiotic therapy and immunodeficient states. [2]

However, infant in our case did not have sickle cell disease. There was no history of prior antibiotic administration. Patient was seronegative for HIV infection. The acellularity and normal biochemistry findings of CSF in this case could be due to early infective stage. We should have repeated lumbar

puncture after 24 hours.

Thus a CSF with a normal cell count, glucose and protein values, and a negative Gram stain smear which usually assumed to exclude the possibility of meningitis does not rule out the meningitis. In fact, normal early CSF findings might result in delay of the appropriate treatment for this potentially fatal condition. [1, 5]

A repeat lumbar puncture should be considered in all febrile patients having clinical features suggestive of meningitis in which the initial CSF study is inconclusive. The antimicrobial therapy should be initiated, pending culture results, whenever bacterial meningitis is clinically suspected even if initial CSF findings are normal because the complications of delayed or inadequately treated meningitis are devastating.

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