Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 9s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

A Study On Biochemical And Haematological Parameters In Acute Respiratory Infection Patients

Dr. Senthil Kumar.T[*1], Dr. Kalpana Devi V[2], Mrs.Ranjitha[3], Ms. Sahaya Merina A[4], Mr. Gowtham.S Raj[5], Ms. Sumithra. D[6]

[*1]Associate professor, Faculty of Allied Health Science, DR MGR Educational and Research Institute, ACS Medical College, Chennai, Tamil Nadu.

Email ID: senacsmlt@gmail.com, Orcid ID: 0000-0003-2173-8154

[2]Principal, Faculty of Allied Health Science, DR MGR Educational and Research Institute, ACS Medical College, Chennai, Tamil Nadu.

[3]Assistant Professor, Assistant Professor Department of Biochemistry School of Allied Health sciences Vinayaka Missions Research Foundation (Deemed to be University) Salem.

Email ID: ranjinithybio@gmail.com

[4]PhD Scholar, Assistant Professor Dept of MLT (Biochemistry), School of Allied Health Science, Vinayaka Missions Research Foundation, deemed to be University, Salem.

Email ID: merinaaugustin@gmail.com

[5,6]Student,College of Allied Health Science, DR MGR Educational and Research Institute, ACS Medical College, Chennai, Tamil Nadu.

Email ID: msgowtham748@gmail.com

Cite this paper as: Dr. Senthil Kumar.T, Dr. Kalpana Devi V, Mrs.Ranjitha, Ms. Sahaya Merina A, Mr. Gowtham.S Raj, Ms. Sumithra. D, (2025) A Study On Biochemical And Haematological Parameters In Acute Respiratory Infection Patients. *Journal of Neonatal Surgery*, 14 (9s), 322-327.

ABSTRACT

Background: Acute respiratory infections (ARI) caused by viruses or bacteria, with an evolution of less than 15 days, and which manifest with symptoms such as cough, nasal congestion and obstruction, sore throat, dysphonia or respiratory distress. The measurement of biochemical parameters provides information about the functional status of major organs. Enzymes are widely used in toxicological studies as markers of detection and evaluation of cell damage. Haematological parameters, including red and white blood cell counts and haemoglobin concentration, are widely used clinical indicators of health and disease. The primary objective of the study is to analyze the Biochemical& Hematological parameters among the acute respiratory infection patients in ACS Medical College and Hospitals.

Method: The Experimental study occurred at the Department of Allied Health Science (AHS) in a private medical college and hospital in Chennai, Tamil Nadu. The study included adolescent people (age >18) with reported acute respiratory infection.

Result: In this study symptomatic patients values are like CBC, AST, and ALT are significantly high and asymptomatic patient's values are insignificant.

Conclusion: We observed that most of the symptomatic patients of Acute respiratory infection has abnormal CBC (HB, Platelet), LFT (AST, ALT) levels. And also, we test the asymptomatic patients of acute respiratory infection, has normal level of CBC & LFT

Keywords: *Acute respiratory infections, biochemical parameters, Hematological parameters, CBC, AST, and ALT.*

1. INTRODUCTION

Acute respiratory infections (ARI) are defined as those infections of the respiratory system, caused by viruses or bacteria, with an evolution of less than 15 days, and which manifest with symptoms such as cough, nasal congestion and obstruction, sore throat, dysphonia or respiratory distress[1].

Recent studies have shown that different laboratory parameters become altered in these patients, and as such are useful as biomarkers to assess the progression of the disease and categorize patients that may present a severe and/or fatal clinical condition[2]. This review analyses biochemical and immunological markers that become altered in COVID-19 patients and their impact on different organs at a hepatic, cardiac, renal and pancreatic level, as well as markers of inflammation, analysing their implications in the evolution of the disease[3].

The measurement of biochemical parameters provides information about the functional status of major organ systems such as the liver, kidney, and hematopoietic and immune systems. Enzymes are widely used in toxicological studies as markers of detection and evaluation of cell damage.

Haematological parameters, including red and white blood cell counts and haemoglobin concentration, are widely used clinical indicators of health and disease[4]. These traits are tightly regulated in healthy individuals and are under genetic control. Acute respiratory infection is a serious infection that prevents normal breathing function[5]. It usually begins as a viral infection in the nose, trachea (windpipe), or lungs. If the infection is not treated, it can spread to the entire respiratory system[6].

Acute respiratory infection prevents the body from getting oxygen and can result in death. Person suffering from this condition needs medical assistance immediately[7]. Also, acute respiratory infections are infectious, which means they can spread from one person to another. The disease is quite widespread. It is particularly dangerous for children, older adults, and people with immune system disorders. According to the World Health Organization (WHO), acute respiratory infections kill an estimated 2.6 million children annually every year worldwide[7].

Acute upper respiratory infections (URI) include the common cold, pharyngitis, epiglottitis, and laryngotracheitis. These infections are usually benign, transitory and self-limited, although epiglottitis and laryngotracheitis can be serious diseases in children and young infants.Viruses cause most upper respiratory tract infections. The most common virus is rhinovirus, which causes the common cold. Other viral causes include: Influenza: causes the flu and can cause more serious illness[8].

Methods:

The Experimental study was undertaken at the Department of Allied Health Science (AHS) within a private medical college and hospital in Chennai, Tamil Nadu. The institutional Scientific and Ethics Committee approved the clinical protocol governing the study. The study included sixty adolescent patientwith perceived acute respiratory infection, age>18. Sample collection: Approximately 5 ml blood sample was taken from each subject using disposable needle and syringe. Decanted into labelled EDTA tube for CBC analyses and plain tube for Urea creatinine (RFT) and total bilirubin (LFT).Then the blood sample was subjected to centrifugation at 2500 rpm for 5 minutes to separate the serum sample. After the centrifugation samples are analysed by semi auto analyser used to determine the urea, creatinine, and total bilirubin. The EDTA blood sample was place in the rotator and analyse the blood sample in ERBA MANHEIM H360 3 PART.

In RENAL FUNCTION TEST (RFT)- For Urea: Take a clean glass test tube**,** Add 1000 micro litre of urea reagent and 20 microlitre of blood serum sample, Incubate it for 10 minutes, And analyse the sample in semi-auto analyser, Note the readings. For Creatinine: Take a clean glass slide,Add 1000 microlitre of creatinine reagent and 100 microlitre of blood serum sample, Incubate it for 10 minutes, And analyse the sample in semi-auto analyser, Note the readings.

For LIVER FUNCTION TEST (LFT)Total bilirubin: Take a clean glass slide, S. Blank Add 1000 microlitre of T. Bilirubin reagent and 50 micro litre of blood serum sample, Incubate for 5 minutes and the sample in semi-auto analyser, sample add 1000 microlitre reagent + 25 microlitre R2 reagent + 50 microlitre sample, Incubate it for 5 minutes, And analyse the sample in semi-auto analyser, Note the readings.

For AST: Take a clean glass slide,Add 1000 microlitre of SGOT reagent and 100 micro litre of blood serum sample,And analyse the sample in semi-auto analyser,Note the readings.

For ALT: Take a clean glass slide,Add 1000 microlitre of SGPT reagent and 100 microlitre of blood serum sample, And analyse the sample in semi-auto analyser, Note the readings.

For Complete blood count (CBC): Place the EDTA blood sample in the rotator for 3-5 minutes, And insert the EDTA blood sample in ERBA MANHEIM H360 3 part to analyse the sample, Note the CBC result.

2. STATISTICAL ANALYSIS

(Group-a), Symptomatic patients of ARI, There is a significant association between symptomatic patients of HB ($p<0.00356$*), AST ($p<0.0355$*), ALT (0.0499*).

(Group-b), Asymptomatic patients of ARI, There is no significant association between asymptomatic patients.

Result:

We collected total no. of 60 samples from symptomatic and asymptomatic acute respiratory infection patients. In this study we was compared the various biochemical and haematological parameters of The Acute respiratory infection divided into by

two types they are upper respiratory and lower respiratory infection they are pharyngitis, bronchitis, Pneumonia, laryngitis, Epiglottitis. We analyzed the biochemical parameters with ERBA Manheim and Hematological parameters with ERBA 360.In these study symptomatic patients values are like CBC, AST, and ALT are significantly high and asymptomatic patient's values are insignificant. Periodic monitoring of these parameters from acute respiratory patients may help in preventing disease.

Table:1

VARIABLE	MEAN	STD	P .VALUE
HB	1.9	0.418	0.0356***
PLT	1.23	0.626	0.081
UREA	1.8	0.996	0.107
CRETININE	2.6	0.758	0.712
BILLURUBIN	1.6	0.932	0.322
AST	0.8	0.402	0.0355***
ALT	0.62	0.402	0.0499**

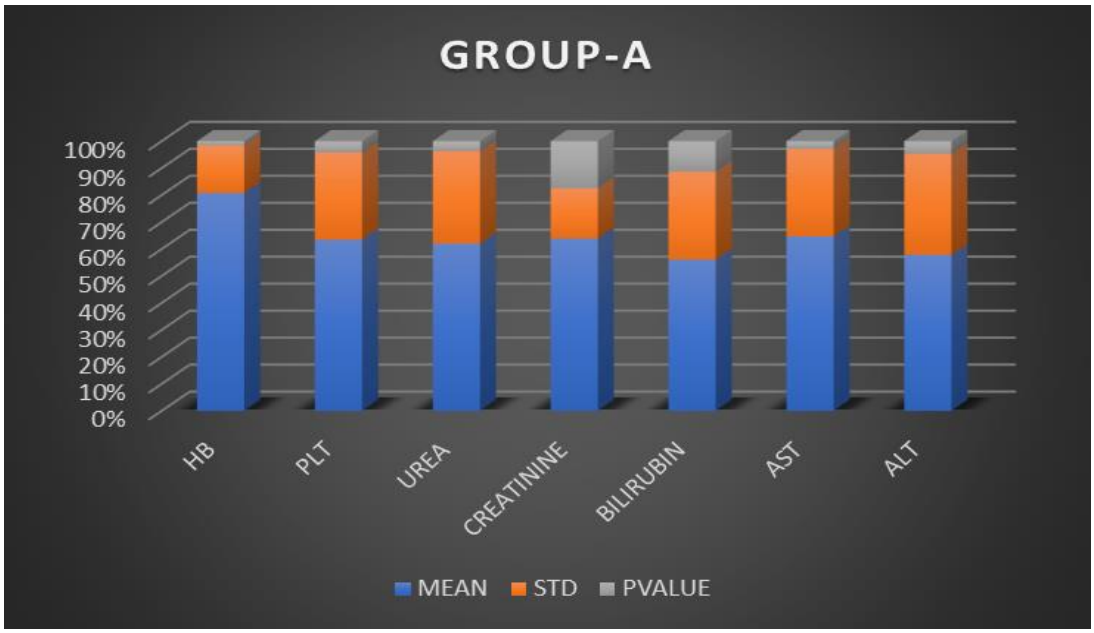

Fig:1

Fig: 1- Shows that symptomatic patients (group-a) OF ACUTE RESPIRATORY INFECTION. There is a significant association between symptomatic patients of HB (p<0.00356*), AST (p<0.0355*), ALT (0.0499*). It indicates there are patients with respiratory infections in this group.

Table: 2

VARIABLE	MEAN	STD	P .VALUE
HB	1.6	0.674	0.298
PLT	1.3	0.479	0.239
UREA	1.4	0.813	0.146

CRETININE	1.6	0.958	0.245
BILLURUBIN	1.4	0.86	0.277
AST	1.23	1.1	0.529
ALT	1.62	0.402	0.95

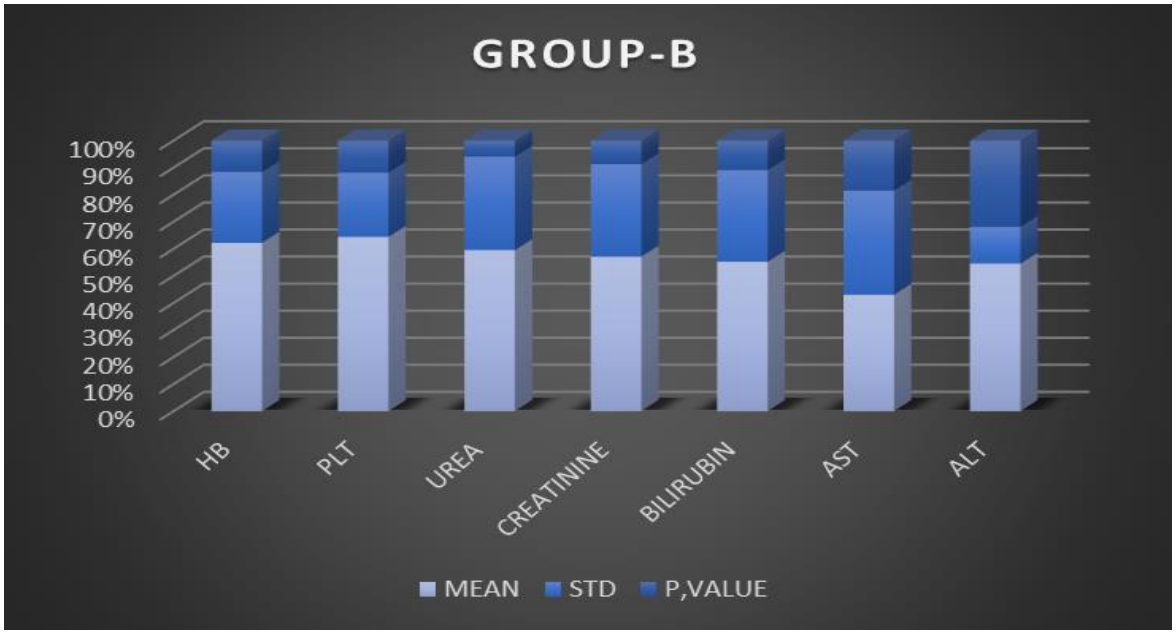

Fig:2

Fig:2 shows that group-b asymptomatic PATIENTS OF ACUTE RESPIRATORY INFECTION. There is no significant association between asymptomatic patients. It indicates there are no patients in this group. They are Normal patients.

3. DISCUSSION

In this study, 60 blood samples were collected (30 control group, 30 study group). And the blood samples were collected for biochemical parameter (total bilirubin, urea, creatinine, AST, ALT) and haematological parameter (HB, platelet) for the study of biochemical and haematological parameter levels on acute respiratory infections patients

There is no significant on association between asymptomatic patients (GROUP-B). These findings are similar to a study done by **Stephen Berman, Kenneth McIntosh**

There is a significant association between symptomatic patients (GROUP-A) Haemoglobin (HB) p Value (<0.0356***), AST p Value (<0.0355***) and ALT p Value (<0.0499***).

4. CONCLUSION

We conclude that most of the symptomatic patients of Acute respiratory infection has abnormal CBC (HB, Platelet), LFT (AST, ALT) levels. And also, we test the asymptomatic patients of acute respiratory infection, has normal level of CBC & LFT. Increased vitamin rich food and promoting regular breathing exercises will prevent the acute respiratory infection. This Acute respiratory infection is particularly dangerous for children, older adults and people with immune system disorders. Most causes of an acute respiratory infection aren't treatable. Getting MMR (measles, mumps and rubella) vaccine will substantially lower your risk of getting a respiratory infection. Vitamin C can prevent an acute respiratory infection; there is a evidence that it can shorten the length of time and severity of some infections. The acute respiratory infections are mostly affects children's. This infections are not treated well its leads to severe illness. A respiratory infection represents the third most frequent health problem for international travellers. The incidence is underestimated mainly because of the majority of infections are mild and incapacitating.

REFERENCES

[1] Dr. Naresh Dang,Acute Respiratory Infection: Symptoms, causes, treatments, https://www.zotezo.com/conditions/acute-respiratory-infection/ March13,2024

[2] Pablo Letelier , Nicole Encina , Pablo Morales , Alejandra Riffo , Halett Silva , Ismael Riquelme , Neftalí Guzmán Role of biochemical markers in the monitoring of COVID-19 patients. 2021 Mar 12;40(2):115-128. doi: 10.5937/jomb0-29341

[3] Osama Najjar, IFCC Interim Guidelines on Biochemical / Hematological Monitoring of COVID-19 Patients. October 7, 2020 https://doi.org/10.1515/cclm-2020-1414

[4] Erhabor, Muhammad HA, Muhammad K, Onwuchekwa C and Egenti NB, Interpretation of Full Blood Count Parameters in Health and Disease, April 28, 2021. DOI: 10.23880/hij-16000180.

[5] Samir N P Kelada, David L Aylor, Bailey C E Peck , Joseph F Ryan , Urraca Tavarez , Ryan J Buus, Darla R Miller, Elissa J Chesler, David W Threadgill , Gary A Churchill, Fernando Pardo-Manuel de Villena, Francis S Collins, Genetic Analysis of Hematological Parameters in Incipient Lines of the Collaborative Cross, 2012 Feb 1;2(2):157–165. doi: 10.1534/g3.111.001776

[6] Ajobiewe H. F.[1], Ajobiewe J. O.[2], Nehemiah Edem, Prevalence of Acute Respiratory Tract Infection (ARI) in Paediatric Patient Attending National Hospital Abuja, Nigeria, 2018; 8(7):132-136 doi:10.5923/j.ajmms.20180807.03

[7] www.healthline.com › health › acute-respiratory-diseaseAcute Respiratory Infection: Causes, Symptoms, and Diagnosis ,MARCH 04 2019, https://www.healthline.com/health/acute-respiratory-disease

[8] Purushothama V. Dasaraju, Chien Liu, Samuel Baron, Medical Microbiology. 4th edition. Galveston (TX): University of Texas Medical Branch at Galveston; 1996. Chapter 93.https://pubmed.ncbi.nlm.nih.gov/21413304/

[9] Zhu N, Zhang D, Wang W, Li X, Yang B, Song J et al. A Novel Coronavirus from Patients with Pneumonia in China,. N Eng J Medic. 2019. 2020;382(8):727-33

[10] The species Severe acute respiratory syndromerelated coronavirus: classifying 2019-nCoV and naming it SARS-CoV-2. Nat Microbiol. 2020;5(4):536-44.

[11] Guo YR, Cao QD, Hong ZS, Tan YY, Chen SD, Jin HJ et al. The origin, transmission and clinical therapies on coronavirus disease 2019 (COVID-19) outbreak - an update on the status. Mil Med Res. 2020;7(1):11.

[12] Yeo C, Kaushal S, Yeo D. Enteric involvement of coronaviruses: is faecal-oral transmission of SARSCoV-2 possible?. Lancet Gastroenterol Hepatol. 2020;5(4):335-7.

[13] Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y et al. Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus–Infected Pneumonia. N EnglJ Medic. 2020;382(13):1199-207.

[14] Ministry of health and family welfare, Government of India. [Internet] Guidelines on the clinical management of COVID-19. Available at: https://www.mohfw.gov.in/pdf/GuidelinesonClinicalManagementofCOVID1912020.pdf. Accessed on 12 May 2020.

[15] Şimşek yavuz S, Ünal S. Antiviral treatment of COVID-19. Turk J Med Sci. 2020;50(SI-1):6119.

[16] Huang L, Zhang X, Zhang X, Wei Z, Zhang L, Xu J et al. Rapid asymptomatic transmission of COVID-19 during the incubation period demonstrating strong infectivity in a cluster of youngsters aged 16-23 years outside Wuhan and characteristics of young patients with COVID 19: A prospective contact-tracing study. J Infect. 2020;80(6):e1-13.

[17] Richardson S, Hirsch J, Narasimhan M, Crawford J, McGinn T, Davidson K et al. Presenting Characteristics, Comorbidities, and Outcomes Among 5700 Patients Hospitalized With COVID-19 in the New York City Area. J Am Med Assoc. 2020.

[18] Zhang C, Shi L, Wang F. Liver injury in COVID-19: management and challenges. Lanc GastroenterolHepatol. 2020;5(5):428-30.

[19] Guan W, Ni Z, Hu Y, Liang W, Ou C, He J et al. Clinical Characteristics of Coronavirus Disease 2019 in China. N Engl J Medic. 2020;382(18):1708-

[20] Terpos E, Ntanasis-Stathopoulos I, Elalamy I, Kastritis E, Sergentanis T, Politou M et al. Hematological findings and complications of COVID-19. Am J Hematol. 2020;

[21] World Health Organization. Clinical management of severe acute respiratory infection when Middle East respiratory syndrome coronavirus (MERS-CoV) infection is suspected: interim guidance. Geneva: World

Health Organization; 2019. [cited on Oct 3, 2020]. Available from https://www.who.int/csr/disease/coronavirus_infections/case-management-ipc/en/

[22] Republic of Turkey. Ministry of Health. Guide of coronavirus disease 19. [cited on Oct 3, 2020]. Available from: https://covid19bilgi.saglik.gov.tr/depo/rehberler/coronavirus disease 19-rehberi/COVID19_REHBERI_GENEL_BILGILER_.

[23] Zhou Y, Yang Z, Guo Y, Geng S, Gao S, Ye S, et al. A new predictor of disease severity in patients with COVID-19 in Wuhan, China. medRxiv. 2020.20042119. https://doi.org/10.1101/2020.03.24.20042119

[24] Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, et al. Clinical course andrisk factors for mortality of adult inpatients with COVID-19in Wuhan, China: a retrospective cohort study. Lancet.2020;395(10229):1054-62. https://doi.org/10.1016/S01406736(20)30566-3

[25] Li Y, Zhao K, Wei H, Chen W, Wang W, Jia L, et al. Dynamicrelationship between D-dimer and COVID-19 severity. BrJ Haematol. 2020;190(1): e24-7. https://doi.org/10.1111/bjh.16811

[26] Deng X, Lui B, Li J, Zhang J, Zhao Y, Xu K, et al. Blood biochemical characteristics of patients with coronavirus disease 2019 (COVID-19): a systemic review and meta-analysis. Clin Chem Lab Med. 2020;58(8):1172-81. https://doi.org/10.1515/cclm-2020-0338

[27] Shang W, Dong J, Ren Y, Tian M, Li W, Hu J, et al. The value of clinical parameters in predicting the severity of COVID-19. J Med Virol. 2020;92(10):2188-92. https://doi.org/10.1002/ok

[28] Shi H, Han X, Jiang N, Cao Y, Alwalid O, Gu J etal. Radiological findings from 81 patients with COVID-19 pneumonia in Wuhan, China: a descriptive study. Lanc Infect Diseas. 2020;20(4):425-34.

[29] Young BE, Ong SWX, Kalimuddin S, Low JG, Tan SY, Loh J et al. Epidemiologic Features and Clinical Course of Patients Infected with SARS-CoV-2 in Singapore. J Am Med Assoc. 2020;323(15):1488–94.

[30] Yang AP, Liu JP, Tao WQ, Li HM. The diagnostic and predictive role of NLR, d-NLR and PLR in COVID-19 patients. Int Immunopharmacol. 2020; 84:106504.

[31] Li X, Xu S, Yu M, Wang K, Tao Y, Zhou Y et al. Risk factors for severity and mortality in adult COVID-19 inpatients in Wuhan. J Allergy Clin Immunol. 2020;146(1):110-8.

[32] Gautret P, Lagier JC, Parola P, Hoang VT, MeddebL, Sevestre J et al. Clinical and microbiological effect of a combination of hydroxychloroquine and azithromycin in 80 COVID-19 patients with at least a six-day follow up: A pilot observational study. Travel Med Infect Dis. 2020; 34:101663.

[33] Guidance for discharge and ending isolation in the context of widespread community transmission of COVID-19 - first update [Internet]. European Centre for Disease Prevention and Control. 2020. Available at: lhttps://www.ecdc.europa.eu/en/publications-data/covid-19-guidance-discharge-and-ending-isolation. Accessed on 12 May 2020. Cite this article as: Agrawal A, Tyagi P, Mahavar S,

[34] COCKBURN, W. C. &AssAAD, F. Bulletin of theWorld Health Organization, 49: 1-12 (1973).

[35] AssAAD F. & COCKBURN, W. C. Bulletin ofthe WorldHealth Organization, 51: 437-445 (1974).

[36] WHO Chronicle, 30: 271 (1976).

[37] SOBESLAVSK4, 0. ET AL. Bulletin of the World HealthOrganization, 55: 625-632 (1977).

[38] MILLER, D. L. Postgraduate medical journal, 49: 748(1973).

[39] CROFTON J. & DOUGLAS, A. Respiratory diseases,2nd ed. Oxford & Edinburgh, Blackwell, 1975.

[40] WHO Official Records, No. 233, 1976, pp. 63-109.

[41] WORLD HEALTH ORGANIZATION. World health statistics annual, 1972, Vol. 1. Geneva, 1975.

[42] WORLD HEALTH ORGANIZATION. World health statistics annual, 1973-76, Vol. 1. Geneva, 1976.

[43] UN demographic yearbook, 1974.

[44] CHABAUD, D. F. & COULANGE, P. Archives del'Institut Pasteur de Madagascar, 44: 147-166 (1975).

[45] BwIBo, N. 0. Tropical andgeographical medicine, 22:167 (1970).

[46] MILLER, D. L. British medical journal, 2: 75 (1964).

[47] PAN AMECAN HEALTH ORGANIZATION. PAHOScientific Publication No. 262, 1973.

[48] GRYZEVSKAJA, E. V. In: Proceedings of the ScientificSession on Staphylococcal Infections, Leningrad, 6-13December 1967.

[49] HOPE-SIMPSON, R. E. & MILLER, D. L. Postgraduatemedical journal, 49: 763-770 (1973).

[50] ANGELESCU, M. The rational use of antibiotics.Bucharest, EdituraMedicala, 1976, pp. 128-13