

ORIGINAL ARTICLE**Study of acute undifferentiated fever cases and their etiologies in rural
Konkan area of Maharashtra state**Patil S. N¹, Korochikar S. P²*Medical Director, B. K.L. Walawalkar Rural Medical College & Hospital, Sawarde¹,
Department of Microbiology, B. K.L. Walawalkar Rural Medical College & Hospital, Sawarde².***Abstract:****Background:**

Acute undifferentiated fever (AUF) is a common cause for which the patients seek health care in India. It is region specific and has similar clinical presentation, with varied etiologies. Due to this it poses challenge to the diagnosis, treatment and public health. Majority of patients present with nondescript symptoms. Scrub typhus, Malaria, Enteric Fever, Dengue, Leptospirosis, Chikungunya, Spotted fever, Rickettsiosis, Hantavirus, Q fever, Brucellosis, Influenza and other bacterial infections are some of the common etiologies of AUF. The prevalence of local AUF etiologies helps to prioritize differential diagnosis and guide the treatment. The study aimed to find out the predominant AUF etiologies in the rural Konkan area of Maharashtra state in India.

Materials and Methods:

This prospective observational study was conducted at a tertiary care hospital on the

samples received from District hospitals and Primary health centers from Sindhudurg District of Maharashtra state for the duration of October 2012 to January 2014. Patients with age ≥ 5 years and with classical symptoms of febrile illness were included in the study. About 500 blood samples received were investigated for Malaria, Bacterial culture sensitivity, Leptospira culture, ELISA for scrub typhus, Brucella, Dengue and Leptospira and further evaluated for commonest region specific AUF etiology.

Results:

The study included 500 blood samples obtained from patients presenting with classical symptoms of AUF. Samples received from males showed highest number of positive cases amounting for 82.47% with majority of cases (83%) cases in middle age group. The sero-positivity of samples accounted for 42.8%. Brucella was the most common cause of AUF (28.50%) followed by Leptospira (27.10%) and Scrub typhus (21.49%). Interestingly there were no positive cases of

malaria and only 11.21% samples positive for Dengue which are considered as most common AUF etiologies and treated accordingly.

Conclusion:

AUF is the most common clinical problem worldwide with varied etiologies and non-descript symptoms. Understanding of etiologies, their local prevalence and their specific features will be helpful in treating AUF cases during various outbreaks.

Key words:

Acute undifferentiated febrile illness, dengue fever, etiology, scrub typhus, Konkan.

Introduction:

The classical manifestation of an infection or illness is fever. It is the most common clinical complaint observed in variety of patients. Acute undifferentiated fever (AUF) also known as acute febrile illness is a common cause for which the patients seek health care in India, especially between the month of June and September⁽¹⁾. An acute febrile illness is characterized by a sudden onset of fever with chills and often diagnosed on the basis of clinical observations. Acute febrile illness has great diversity of etiology and poses challenge to the diagnosis, treatment and public health response to the endemic and epidemic

diseases. Majority of patients show non-descript symptoms like Fever with chills, Headache, Retro-orbital pain, Myalgia, Arthralgia, Rash, Hemorrhagic manifestation and Leucopenia. The reports indicate that Scrub typhus, Malaria, Enteric Fever, Dengue, Leptospirosis, Chikungunya, Spotted fever, Rickettsiosis, Hantavirus, Q fever, Brucellosis, Influenza and other bacterial infections like UTI, Respiratory Tract infections and diarrheal diseases are some of the common etiologies of AUF⁽²⁾. The prevalence of local AUF etiologies determines the prioritization of differential diagnosis of the clinical syndrome⁽³⁾.

In the developing countries usually acute febrile illness is considered as either dengue or malaria and the treatment is given accordingly. Laboratory evaluations for fever in developing countries usually include microscopy of thick and thin blood smears for malaria. In India, although about 100 million individuals are investigated for malaria by microscopy every year, as per the official estimates only less than 2% of them are slide-positive. The annual slide positivity in malaria-endemic countries is estimated to be about 5% (6 million confirmed cases of 128 million individuals investigated in 43 countries)^(4,5). The estimates show that, about 30% to 90% of all patients with AUF are treated with antimalarial drugs, though only 7

to 45% of them have laboratory confirmed malaria⁽⁶⁾.

There is inadequate understanding among the health care providers about proper diagnosis and treatment for acute febrile illness. In rural parts of India the health sector is underdeveloped with inadequate health care facilities and resources for proper diagnosis of disease. Reporting of cases and a treatment seeking is lethargic and there is no health awareness in the community. Acute febrile illness can lead to fatal conditions if misdiagnosed or mistreated.

There is paucity of data regarding AUF etiologies in rural Konkan region of Maharashtra. This study was aimed to determine the prevalence of AUF etiologies at a rural tertiary care hospital at Sindhudurg District of Maharashtra state.

Materials and Methods:

The study was conducted at BKL Walawalkar Hospital; a 500 bedded rural tertiary health care center. Samples were obtained from patients treated at Civil hospital and various Primary Health Centers of Sindhudurg district viz; District Hospital Sindhudurg, Sub District Hospital Kankavali, Kudal, Sawantwadi and Primary health centers from Hirlok, Kasal, Kalsuli, Kharepatan, Nandgaon, Varavade, Mangaon and Hivale. The duration of study was from October 2012 to January 2014.

Patients with age ≥ 5 years and with febrile illness with symptoms like fever with duration of 2 to 14 days & oral or axillary temperature $\geq 38^\circ\text{C}$, body ache, rash, abdominal pain, ocular pain and red eyes and who consented for the study were included. The patients who denied consent and with fever localizing the source of infection to skin, soft tissue, respiratory, gastrointestinal, meningeal or genitourinary tract were excluded from study. 18 ml of venous blood sample was collected aseptically before the administration of the antibiotics. The sample was dispensed 2 drops in EMJH medium, 8 to 10 ml in BacTec bottle, 6ml in plain Vacutainer and 2 ml in EDTA Vacutainer.

The samples were investigated for Malaria, Bacterial culture sensitivity, Leptospira culture by EMJH method, ELISA for scrub typhus, Brucella, Dengue and Leptospira. The observations of investigations were recorded for analysis with reference to age, gender, investigations, area and etiologies.

Results:

Total 500 samples were received for the study from October 2012 to January 2014. Maximum 104 (20.8%) samples were received from Sub District Hospital Kankavali followed by 87 (17.4%) samples from District Hospital Oras respectively.

Among 500 samples investigated, 336 samples belonged to males and 164 to females respectively. The age ranged from 12 to 80 years with mean age of 36.52 ± 15.22 years. Maximum 415 (83%) cases belonged to age group above 50 years including 277 (82.47%) cases of Males.

The investigations indicated 214 (42.8%) positive cases with maximum 61 (28.50%) Brucella positive cases followed by 58 (27.10%) of Leptospira and 46 (21.49%) scrub typhus positive cases by ELISA. Interestingly there were no cases positive for malaria.

The samples from District Hospital Oras showed highest 57 (65.4%) positive cases with maximum 16 (18.4%) cases of Scrub typhus, 14 (16%) Leptospira ELISA Positive and 13 (14.9%) Brucella Positive cases.

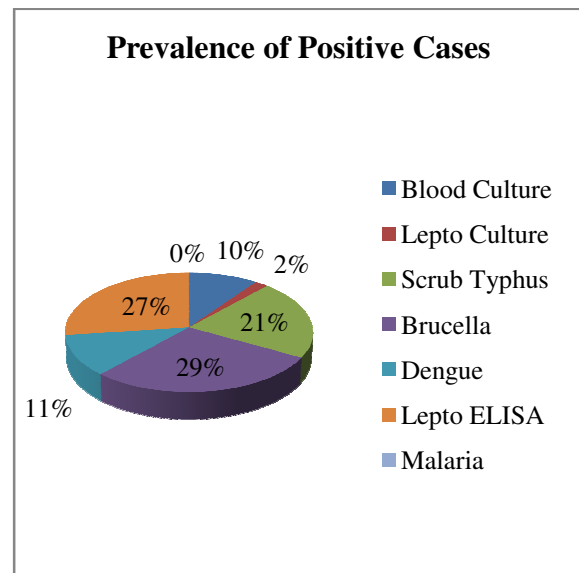
The Bacterial culture indicated 21 (4.2%) positive cases including 3 Gram negative bacilli and 14 Gram positive cocci with Staphylococcus as a common isolate accounting for 13 (61.90%) positive cultures. The antibiotic sensitivity pattern against 29 antibiotics showed Gram positive cocci showing 100 % resistance to 12 antibiotics viz; Amox/KClav, Amphotericin/ Sulbactam, Amphotericin, Cefazolin, Cefepime, Cefotaxime, Ceftriaxone, Cefalothin, imipenem, Nitrofurantoin, Norfloxacin and Oxacillin. The gram negative bacilli show 100% resistance to 7 antibiotics viz;

Aztreonam, Cefotaxime/K Clav, Ceftazidime/K Cal, Cefalothin, Nitrofurantoin, Tetracyclin, Trimeth/Sulf. Also 100% susceptibility was observed for 4 antibiotics viz; Imipenem, Levofloxacin, Meropenem, Ticar/K Clav.

Thus the results indicate predominance of Brucella, Leptospira and Scrub typhus cases most common in Males as compared to females with maximum cases in age group above 50 years.

Figures and Tables:

Fig 1: Prevalence of AUF cases Positive for various investigations



Discussion:

The study aimed to determine the common AUF etiologies prevalent in the rural Konkan region.

Out of 500 samples investigated, 336 samples belonged to males and 164 to females

respectively. The age ranged from 12 to 80 years with mean age of 36.52 ± 15.22 years. Highest 415 (83%) cases belonged to age group above 50 years i.e. middle age group which is the working group at a risk for exposure to infectious agents. Maximum 277 (82.47%) cases belong to Males which is likely due to increased chances of exposure to pathogens as males predominantly work outside. The findings are consistent with other studies⁽⁷⁾.

The study shows predominant AUF etiologies like Brucella (61, 28.50%), Leptospira (58, 27.10%) and Scrub typhus (46, 21.49%) which are zoonotic diseases most prevalent in rainy season and common in farmers and individuals with close contact of cattle or exposed to contaminated water by the excreta of infected animals especially rats. Many studies indicate Leptospira, Rickettsiae, Malaria and Dengue as most common etiologies of AUF. The findings of Leptospira and Scrub typhus are consistent with other

studies except that of Malaria and Dengue (1). In current study there were no cases of malaria associated with AUF while the Dengue positive samples accounted for only 24 (11.21%) cases. The findings from a study in Karnataka indicate Scrub typhus as most common cause of acute fever followed by Leptospirosis which is consistent with findings in current study⁽⁸⁾.

Fig 2: Gender based distribution of positive AUF cases

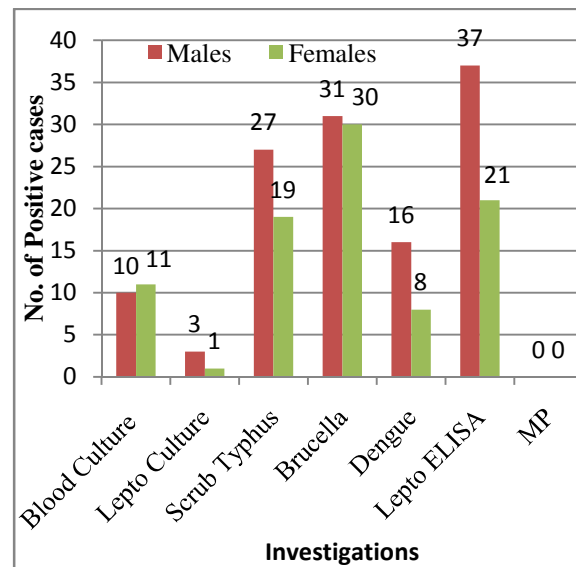


Table 1: Distribution of Positive AUF cases

Infection	Area wise percentage of positive cases <i>n</i> (%)												Total
	DH Oras	SDH Kankavli	SDH Kudal	SDH Sawantwadi	Kharepatan	Kalsuli	Nandgaon	Varavade	Mangaon	Hirlok	Hivale	Kasal	
Total Samples	87 (17.4)	104 (20.8)	33 (6.6)	5 (1)	27 (5.4)	20 (4)	37 (7.4)	28 (5.6)	62 (12.4)	46 (9.2)	25 (5)	26 (5.2)	500 (100)
Blood Culture	3 (3.5)	3 (2.9)	0 (0)	0 (0)	2 (7.4)	1 (5)	3 (8.1)	0 (0)	4 (6.5)	1 (2.2)	0 (0)	4 (15.4)	21 (4.2)
Leptospira Culture	2 (2.3)	1 (0.96)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1.6)	0 (0)	0 (0)	0 (0)	4 (0.8)
Scrub Typhus	16 (18.4)	7 (6.7)	3 (9.1)	2 (40)	2 (7.41)	1 (5)	1 (2.7)	2 (7.1)	7 (11.3)	1 (2.2)	2 (8)	2 (7.7)	46 (9.2)
Brucella	13 (14.9)	15 (14.4)	7 (21.2)	0 (0)	3 (11.1)	3 (15)	1 (2.7)	1 (3.6)	6 (9.7)	4 (8.7)	2 (8)	6 (23.1)	61 (12.2)
Dengue	9 (10.3)	6 (5.8)	0 (0)	0 (0)	4 (14.8)	1 (5)	1 (2.7)	0 (0)	2 (3.2)	0 (0)	1 (4)	0 (0)	24 (4.8)
Lepto ELISA	14 (16.0)	6 (5.8)	4 (12.1)	0 (0)	0 (0)	2 (10)	4 (10.8)	1 (3.6)	11 (17.7)	10 (21.7)	3 (12)	3 (11.5)	58 (11.6)
Malaria	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Area wise Total Positive Cases	57 (65.4)	38 (36.6)	14 (42.4)	2 (40)	11 (40.7)	8 (40)	10 (27)	4 (14.3)	31 (50)	16 (34.7)	8 (32)	15 (57.7)	214 (42.8)

With scarce diagnostic facilities and treatment options in rural parts of India, majority of clinicians assume that the patient with AUF is likely to be suffering from malaria or either dengue and the treatment is given accordingly. A similar study in central India on Non malarial Acute Undifferentiated (NMAUF) cases revealed that about 39.9% patients with NMAUF received unnecessary treatment with antimalarial drugs, indicating need for awareness and guidelines to improve treatment strategies for AUF cases⁽⁹⁾.

The samples from District Hospital Oras showed highest 57 (65.4%) positive cases with maximum 16 (18.4%) cases of Scrub typhus, 14 (16%) ELISA positive and 13 (14.9%) Brucella positive cases.

Table 2: Account of Bacterial culture isolates

Sr. No.	Isolates	Count
A	Gram Positive Cocci	14
1	Staphylococcus species	13
2	Micrococcus species	1
B	Gram Negative Bacilli	3
3	Escherichia coli	2
4	Pseudomonas species	1
C	Miscellaneous	4
5	Candida	4
Total		21

Oras is a coastal city inhabited by the major population of Sindhudurg district with tourism, fishing and agriculture as its major occupation. The regional prevalence of pathogens and their chances of exposure to the local people influence the disease pattern.

The Bacterial culture indicated 21 (4.2%) positive cases including 3 Gram negative bacilli and 14 Gram positive cocci with Staphylococcus as a common isolate accounting for 13 (61.90%) positive cultures. The findings are consistent with other studies on bacterial etiologies of AUF. Bacterial infection is one of the known etiologies for AUF with *S. aureus* and *E. coli* common isolates⁽¹⁰⁾.

Thus the results indicate predominance of Brucella, Leptospira and Scrub typhus as most common AUF etiologies especially in Males with maximum cases in middle age group above 50 years.

Conclusion:

Acute febrile illness is the most common clinical problem worldwide with the diversity of etiologies and non descript symptoms, it poses challenge to the diagnosis, treatment and public health. As most commonly AUF is diagnosed on basis of clinical observations due to lack of treatment protocols and diagnostic facilities especially in the rural parts there is tendency of under treatment of other cause of AUF. The patients

are unnecessarily treated with anti bacterial and anti malarial drugs and also subjected to unnecessary investigations adding to the cost of treatment. Understanding of etiologies, their local prevalence and their specific features will be helpful in treating AUF cases during various outbreaks.

Conflict of interest: None to declare

Source of funding: Nil

Acknowledgement:

The authors express the deepest gratitude to the Civil Surgeon, Medical Superintendent, Resident Medical Officer, Pathologist of Sindhudurg district Hospital, District health officer ;Sindhudurg, Taluka Health Officer, PHC Medical Officer involved in the study.

Funding:

The study was partially funded by Director of Health Services, Maharashtra State.

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