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An Epidemiological and Bacteriological Study of Chronic Bacterial Folliculitis

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A B S T R A C T

Most common cause of folliculitis is bacteria especially *Staphylococcus aureus*. However, fungal infections, viruses and physical trauma to the follicle can all contribute to folliculitis. Folliculitis may last short time (acute case) or persist long term (chronic case). We have aimed to assess epidemiological, precipitating factors and microbiological aspects of chronic bacterial folliculitis. Sixty cases of chronic bacterial folliculitis which are diagnosed clinically and confirmed microbiologically are selected and all the age groups of both sexes were included in this study. Data related to patient clinical history, bacterial culture and sensitivity was entered into spread excel sheet. Results were analyzed and tabulated. Most of the chronic bacterial folliculitis (CBF) cases were between the age group of 21-30 years i.e., 29 out of 60 (48.3%), followed by 31-40 years, i.e., 18 out of 60 (30%). Male predominance noted. Out of 60 isolates, 42 (70%) *Staphylococcus aureus* were isolated. Other bacteria isolated were *Pseudomonas aeruginosa* (13.3%), Coagulase Negative Staphylococci (11.6%), *Proteus* species (5%). All isolates were tested against various cases of antibiotics according to CLSI guidelines. Out of 42 isolates of *Staphylococcus aureus*, 35 (83.3%) were sensitive to doxycycline, 32 (76.1%) were sensitive to ciprofloxacin and piperacillin+tazobactum, 30 (71.4%) were sensitive to erythromycin and amoxyclav, 27 (64.2%) were sensitive to clindamycin, 17 (40.4%) were sensitive to cefoxitin, 13 (30.9%) were sensitive to ampicillin and ceftriaxone. All the isolates were sensitive to vancomycin and linezolid. Diagnosis of Chronic Bacterial Folliculitis can be done easily in most of the cases on clinical examination. Culture and sensitivity of pus samples from such cases helps to treat patients appropriately and also aids in reduction of complications. Making a policy by dermatologists to follow antibiotic therapy according to sensitivity report helps in decreasing the incidence of antibiotic resistance.

Introduction

Pyogenic infections are more common in developing and the underdeveloped countries, usually takes a chronic course. Folliculitis is an infection of hair follicles. Folliculitis is classified based on i) level of involvement of hair follicle as superficial folliculitis (infection at the level of follicular ostia) and deep folliculitis (infection at the level of hair

bulb) ii) according to microbiological etiology includes bacterial folliculitis, viral folliculitis, fungal folliculitis and helminthes.

Predisposing factors of pyogenic infections are overcrowding, malnutrition, improper hygiene (1). Folliculitis is linked to shaving, tight clothing, ingrown hairs, tight hair braids, sweat, skin conditions such as acne, dermatitis, insect bites, obesity and weakened immune system (2).

Most common cause of folliculitis is bacterial especially *Staphylococcus aureus*. However, fungal infections, viruses and physical trauma to the follicle can all contribute to folliculitis. Types of folliculitis include Razor bumps, hot tub rash and barber's itch (3).

Folliculitis can appear on any region over skin and scalp. Most commonly affects the arms, legs, buttocks, genitals, chest, back, head and face. Folliculitis may last short time (acute case) or persist long term (chronic case).

Folliculitis starts as a rash or a patch of red papules or yellow or white tipped pimples, slowly the lesions increase in size associated with itching or burning or pain. Overtime, this can spread to nearby hair follicles and progress to crusty sores. Complications of folliculitis include recurrent folliculitis, furunculosis, alopecia, scars or pigmentation and cellulitis (4). Here in this study, we have tried to assess epidemiological, precipitating factors, microbiological aspects of chronic bacterial folliculitis.

Materials and Methods

A Prospective study over a period of one year from Nov 2012 to Oct 2013 was conducted on patients attending the Department of Dermatology and STD at Government General Hospital, Kurnool. 60 cases of chronic bacterial folliculitis which are diagnosed clinically and confirmed microbiologically are selected and all the age groups of both sexes were included in this study.

Careful history pertaining to this study was elicited including age, sex, occupation, socioeconomic status, significant past and family history, lesions related clinical details such as site, morphology, distribution, duration, progression, mode of onset, seasonal variation, any related predisposing factors.

General and systemic examination was done thoroughly. All the studied population were advised to undergo routine blood investigations, pus culture and sensitivity & in specific cases required investigations such as random blood sugar, renal function tests, tzanck smear, scrapings for fungal mount, skin biopsy were also advised to rule out other etiologies.

After collection of Pus samples from chronic folliculitis at Department of Microbiology, two swabs from each patient were processed immediately for culture and sensitivity. One swab used for gram stain and another swab streaked on Nutrient agar, Blood agar, MacConkey agar, incubated at 37^{o}C for 24 hours. Identification of bacteria was based on colony characteristics on media and standard biochemical reactions performed with colonies. Antibiotic sensitivity testing was processed on Mueller Hinton agar by Modified Kirby Bauer disc diffusion method according to CLSI guidelines. Data related to patient clinical history, bacterial culture and sensitivity was entered into spread excel sheet. Results were analyzed and tabulated.

Results and Discussion

Most of the chronic bacterial folliculitis (CBF) cases were between the age group of 21-30 years i.e., 29 out of 60 (48.3%),

followed by 31-40 years, i.e., 18 out of 60 (30%). Youngest person observed with CBF was 5 years child diagnosed as scalp bacterial folliculitis. 17 (28.3%) cases out of 60 CBF were presented with sycosis barbae (Table 1).

Out of 60 chronic bacterial folliculitis cases, 51 (85%) were males, and 9 (15%) were females. Majority of the cases were observed during summer season exacerbation i.e., 48 (80%) out of 60. Chronic bacterial folliculitis patients predominantly presented with itching (76.6%), burning sensation (63.3%) followed by pain (41.6%) and cosmetic complaints (38.3%) (Table 2).

On clinical assessment of dermatological lesions, papules, pustules, scaling and partial alopecia were commonly seen. 70% patients presented with pustule predominantly and other lesions were 66.6% papules, 56.6% scaling, 53.3% alopecia, 43.3% erythema, 25% crusting, 21.6% pigmentation and 20% eczema (Chart 1, Fig. 1 and 2).

Nine (15%) cases of CBF were associated with tinea infections and seborrhoeic dermatitis. 8 (13.3%) cases were associated with Milaria rubra, 5 (8.3%) cases had acne, 3 (5%) cases had psoriasis and one (1.6%) case was found to have vitiligo.

Pus culture and sensitivity testing revealed the most common isolate among chronic bacterial folliculitis is *Staphylococcus aureus*. Out of 60 isolates, 42 (70%) *Staphylococcus aureus* were isolated. Other bacteria isolated were *Pseudomonas aeruginosa* (13.3%), Coagulase Negative Staphylococci (11.6%), *Proteus* species (5%) (Chart 2).

All isolates were tested against various cases of antibiotics according to CLSI guidelines. Out of 42 isolates of *Staphylococcus aureus*, 35 (83.3%) were sensitive to doxycycline, 32 (76.1%) were sensitive to ciprofloxacin and piperacillin+tazobactum, 30 (71.4%) were sensitive to erythromycin and amoxyclav, 27 (64.2%) were sensitive to clindamycin, 17 (40.4%) were sensitive to cefoxitin, 13 (30.9%) were sensitive to ampicillin and ceftriaxone. All the isolates were sensitive to vancomycin and linezolid (Table 3).

Out of 7 isolates of Coagulase Negative staphylococcus, 6 (85.7%) were sensitive to Amoxyclav, ciprofloxacin, 5 (71.4%) were sensitive to Erythromycin, Ceftriaxone, cefoxitin, 4 (57.1%) were sensitive to clindamycin, piperacillin+tazobactum, 2 (28.5%) were sensitive to ampicillin. All the isolates were sensitive to doxycycline, vancomycin and linezolid (Table 3).

Out of 8 *Pseudomonas aeruginosa* isolates, 7 (87.5%) were sensitive to amikacin, doxycycline, 6 (75%) were sensitive to ciprofloxacin, 5 (62.5%) were sensitive to imipenem, 4 (50%) were sensitive to ceftazidime, cefaperazone, piperacillin + tazobactum, 2 (25%) were sensitive to amoxyclav. All isolates were sensitive to colistin (Table 4).

Out of 3 *Proteus* species isolates, all 3 isolates (100%) showed sensitivity to ciprofloxacin, imipenem, 2 (66.6%) were sensitive to amikacin, ceftazidime, amoxyclav, cefaperazone, piperacillin + tazobactum, and 1 (33.3%) showed sensitivity to ceftriaxone, cefotaxime (Table 4).

Patients were treated with antibiotics according to culture and sensitivity, of long course about 4 to 6 weeks. Along with antibiotics, antiseptic lotions were suggested for chronic and recurrent cases.

Skin acts as a mechanical barrier to eliminate invasion of pathogenic microorganisms; by several mechanisms such as periodic desquamation, desiccation, drying, presence

of fatty acids, negative electric charge of the skin etc.,

Most of the chronic bacterial folliculitis (CBF) cases were between the age group of 21-30 years i.e., 29 out of 60 (48.3%), followed by 31-40 years, i.e., 18 out of 60 (30%). Out of 60 chronic bacterial folliculitis cases, 51 (85%) were males, and remaining 9 (15%) were females as per this study. Prasad PVS *et al.,* (6) did a study on chronic folliculitis of legs, observed most commonly in the age group of 16-25 years, predominantly in males. Jappa *et al.,* (7) reported folliculitis was commonest in the age group of 21 to 30 years. There is evidence that males carry higher numbers of aerobic bacteria than females (8). Desai *et al.,* (9) and Clarke *et al.,* (10) also noted male predominance.

Ramani *et al.,* (1), Chopra *et al.,* (11) and Khare *et al.,* (12) have reported incidence of furunculosis as is 42.68%, 68.29%, and 55.98% respectively.

Majority of the cases were observed during summer season exacerbation i.e., 48 (80%) out of 60 in the present study. In similar to this study Sugathan *et al.,* (13) noticed more than 50% of folliculitis cases showed summer exacerbation. Lokesh S Jappa *et al.,* (7) documented 49% of cases were commonly seen in monsoon season.

As per this study, 70% patients presented with pustule predominantly and other lesions were 66.6% papules, 56.6% scaling, 53.3% alopecia, 43.3% erythema, 25% crusting, 21.6% pigmentation and 20% eczema. Prasad PVS *et al.,* (6) reported 86% of cases presented with a mixture of papules and pustules; and 86% cases had pruritus. Chopra *et al.,* (11) and Khare *et al.,* (12) reported incidence of superficial folliculitis as 39.29% and 30.49%.

Mathew *et al.,* (14) observed increased frequency of superficial folliculitis and furunculosis on the legs which coincide with present study. However Venniyil *et al.,* (15) found furunculosis to be the most common type of folliculitis in a recent Indian study.

In the present study, out of 60 isolates from chronic bacterial folliculitis cases, 42 (70%) *Staphylococcus aureus* were isolated. Other bacteria isolated were *Pseudomonas aeruginosa* (13.3%), Coagulase Negative Staphylococci (11.6%), *Proteus* species (5%). Jappa *et al.,* (7) revealed 89% of folliculitis patients had *Staph. aureus* (including mixed growth of *S. aureus* and beta haemolytic streptococci) and 9% had *Staph. epidermidis* (including mixed growth of *Staph. epidermidis* and Beta haemolytic streptococci), Beta haemolytic streptococci was seen as mixed isolate in 7% cases. High incidence of coagulase positive Staphylococci in pyoderma was reported by several other workers (1,12,14).

Mild folliculitis can be managed by warm compresses by placing a warm compress/cloth on the affected area for up to 20 minutes; by maintaining good hygiene by cleaning twice daily with soap solution, using clean cloth; soothing bath and skin protection.

Moderate and severe folliculitis needs a combination therapy with long term systemic antibiotics, topical antibiotics, corticosteroids and avoidance of risk factors (16). Number of therapies have been tried by different studies including psoralen with UV-A therapy (PUVA) therapy (16), ciprofloxacin (17, 18), rifampicin, dapsone (19), minocycline (20).

Out of 42 isolates of *Staphylococcus aureus*, 35 (83.3%) were sensitive to doxycycline, 32 (76.1%) were sensitive to ciprofloxacin and piperacillin+tazobactum, 30 (71.4%) were sensitive to erythromycin and amoxyclav, 27

(64.2%) were sensitive to clindamycin, 17 (40.4%) were sensitive to cefoxitin, 13 (30.9%) were sensitive to ampicillin and ceftriaxone. All the isolates were sensitive to vancomycin and linezolid in this study.

Bhawani *et al.*, (21) documented, with an exception of 10 strains, all the 252 strains of Staphylococci were resistant to Penicillin, moderate resistance was observed to Cephalexin and Cloxacillin in coagulase positive Staphylococci. The strains from all the sources were sensitive to Methicillin and Gentamycin. Jappa *et al.*, (7) concluded out of 83 patients with *Staphylococcus aureus*, 76 isolates were resistant to ampicillin. Maximum sensitivity to *S. aureus* was seen with netilimycin followed by ciprofloxacin and ceftriaxone. Maximum sensitivity to *S. epidermidis* was seen with netilimycin followed by ciprofloxacin and gentamycin.

Table.1 Incidence of chronic bacterial folliculitis in different age groups

Age in years	No. of patients	Percentage
0-10	1	1.6%
11-20	8	13.3%
21-30	29	48.3%
31-40	18	30%
41-50	3	5%
>50	1	1.6%

Table.2 Presenting complaints of chronic bacterial folliculitis patients

Presenting complaints	No. of patients	Percentage
Itching	46	76.6%
Pain	25	41.6%
Cosmetic complaint	23	38.3%
Burning sensation	38	63.3%

Table.3 *Staphylococcus aureus* and coagulase negative staphylococci sensitivity pattern

Antibiotics	*Staphylococcus aureus*			Coagulase negative staphylococci (CoNS)		
	S	I	R	S	I	R
Erythromycin	30	-	12	5	-	2
Clindamycin	27	-	15	4	-	3
Ampicillin	13	5	24	2	-	5
Cefoxitin	17	-	25	5	-	2
Amoxyclav	30	3	9	6	1	-
Ciprofloxacin	32	-	10	6	-	2
Ceftriaxone	13	3	26	5	-	2
Piperacillin+tazobactum	32	2	8	4	-	3
Doxycycline	35	-	7	7	-	-
Linezolid	42	-	-	7	-	-
Vancomycin	42	-	-	7	-	-

Table.4 *Proteus* species and *Pseudomonas aeruginosa* sensitivity pattern

Antibiotics	*Proteus* species			*Pseudomonas aeruginosa*		
	S	I	R	S	I	R
Amikacin	2	-	1	7	-	1
Ceftriaxone	1	-	2	-	-	-
Ceftazidime	2	-	1	4	1	3
Amoxyclav	2	-	1	2	-	6
Imipenem	3	-	-	5	2	1
Cefaperazone	2	-	1	4	1	3
Ciprofloxacin	3	-	-	6	1	1
Piperacillin+tazobactum	2	-	1	4	1	3
Ceftriaxone	1	-	2	-	-	-
Doxycycline	-	-	-	7	-	1
Colistin	-	-	-	8	-	-

Fig.1 Chronic bacterial folliculitis of leg

Fig.2 Chronic bacterial folliculitis of scalp

Chart.1 Clinical findings of chronic bacterial folliculitis

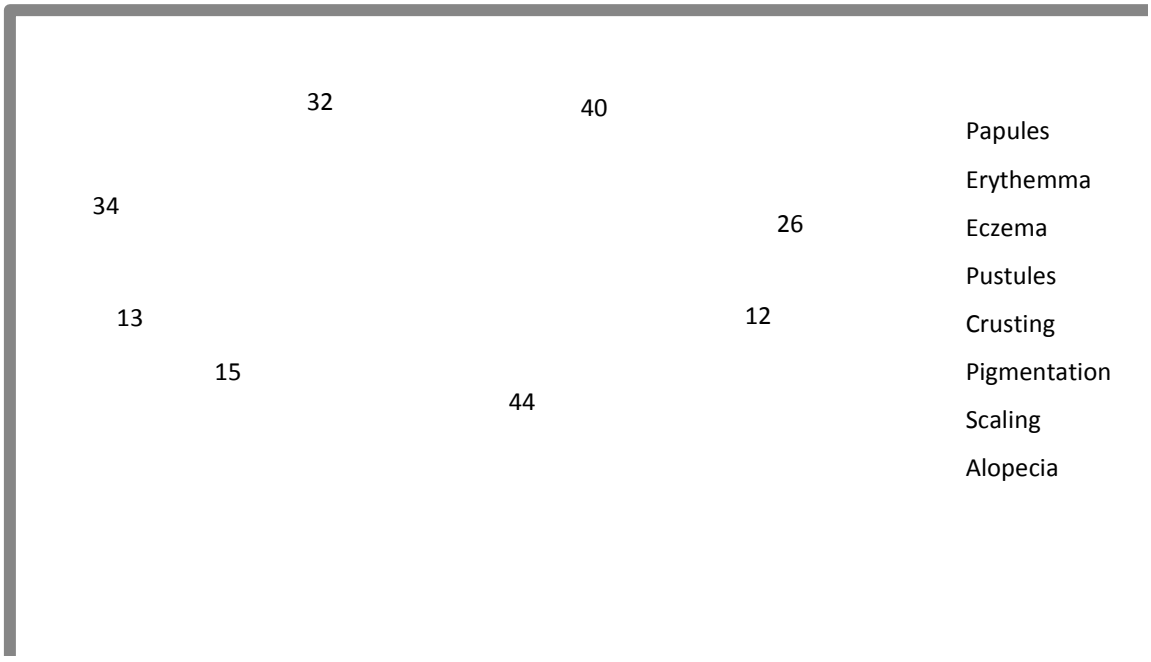
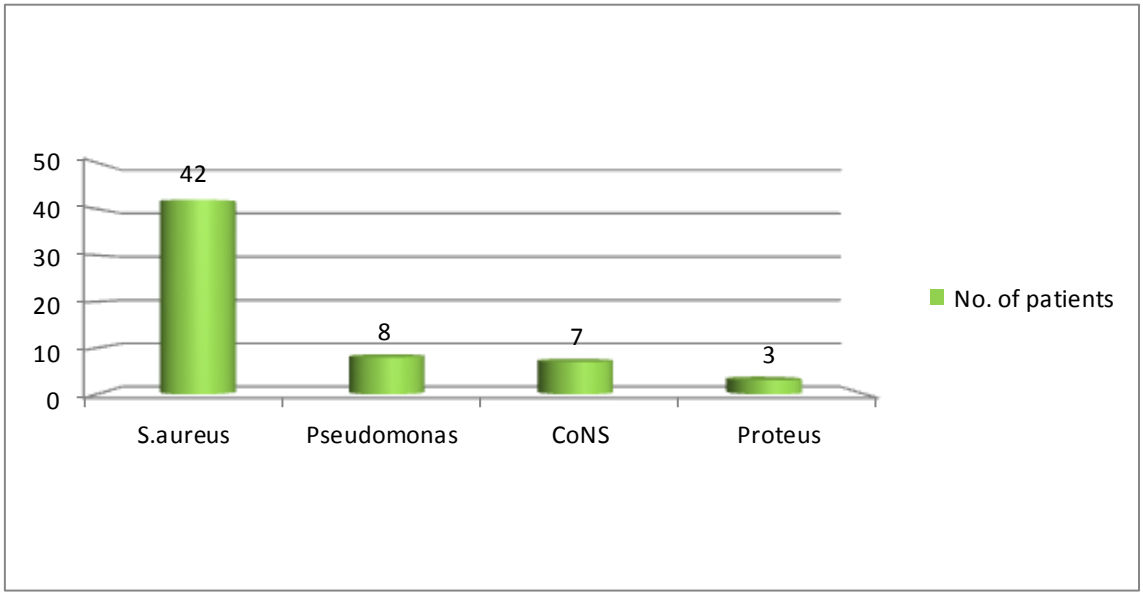


Chart.2 Representing various bacterial isolates of chronic bacterial folliculitis



Prasad (20) *et al.*, reported 50% patients on Minocycline in a dose of 100 mg od for 21 days responded, 25% patients showed a mild clinical recurrence.

Sukumaran Pradeep Nair *et al.*, (22) reported a case of disseminate and recurrent infundibulo folliculitis in a 17 year old male patient from Kerala, South India; presented with multiple follicular papules and occasional pustular distributed on the neck, upper chest, upper posterior trunk and proximal extremities of 4 months duration; confirmed by histopathology report. They noticed moderate response in this patient on treatment with NB-UVB along with 0.1% topical tacrolimus for 8 weeks.

In conclusion, most of the Chronic Bacterial Folliculitis patients were adult males; presented predominantly with papules and pustules. *Staphylococcus aureus* is most common pathogen isolated showed more than 50% sensitivity to doxycycline, ciprofloxacin, piperacillin/tazobactum, erythromycin, clindamycin, amoxyclav. Diagnosis of Chronic Bacterial Folliculitis can be done easily in most of the cases on clinical examination. Culture and sensitivity of pus samples from such cases helps to treat patients appropriately and also aids in reduction of complications. Making a policy by dermatologists to follow antibiotic therapy according to sensitivity report helps in decreasing the incidence of antibiotic resistance.

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