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RESEARCH ARTICLE

CLINICO-MICROBIOLOGICAL STUDY OF PYODERMAS

Janardhan. B[1*], Prasad.GK[2], Nandeshwar.AJ[3] and Vidyavathi.N[4]

[1,2,4*]Department of Dermatology, Venereology & Leprosy (DVL), Mediciti Institute of Medical Sciences (MIMS)
[3]Department of Microbiology, Mediciti Institute of Medical Sciences

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ABSTRACT

Background: Pyoderma is pyogenic skin infection caused mainly by Staphylococci and Streptococci are common skin infections presenting to Dermatology clinics. **Aim**: To study clinical profile, know causative organism(s) and their antibiotic susceptibility pattern. **Materials & methods**: All out patients & in patients reporting to MediCiti medical college / hospital with pyoderma skin lesions of 100 cases were included in the study. After obtaining consent, detailed clinical history noted. Gram staining was done & the specimens are inoculated for growth on nutrient agar, sheep blood agar and Mac Conkey's agar plates. The organisms were identified on the basis of morphology & culture characteristics including antibiotic sensitivity. Antibacterial sensitivity testing was done by Bauer Kirby method using Mueller Hinton agar plate supplied by Himedia. The study period was one year. **Results**: Among 100 cases, primary pyodermas were 66 and secondary pyodermas 34 cases. Bacterial culture shown growth of single organism from 84 cases, 4 cases shown mixed growth & 12 cases no growth. The commonest organism isolated predominantly was Coagulase positive Staphylococcal aureus in 39 cases followed by Coagulase negative staphylococcal organism in 14 cases and other organisms in remaining cases. Coagulase positive staphylococcus aureus isolated was sensitive to antibiotic drugs like Amoxicillin+Clavulanic acid, piperacillin+Tazobactum, Vancomycin, Ceftriaxone, Cefixime and resistant to Lomefloxacin, Ceftazidime, Erythromycin, Cefoxitine, Cefuroxime. Coagulase negative staphylococci were sensitive to Doxycyclin, Amoxicillin+Clavulanic acid, Erythromycin, Cefepime, and Ceftriaxone and resistant to Amoxicillin, Oxacillin, Lomefloxacin & Gentamicin. Klebsiella species shows sensitivity to Ceftazidime / Clavulanic acid, Cefepime and resistant to Ampicillin. Pseudomonas species shows sensitivity to Ceftazidime / Clavulanic acid, Cefepime and resistant to Ampicillin. **Conclusions**: This study shows the present pattern of bacteriological profile of pyodermas in patients attending MediCiti medical college/hospital. Staphylococcus was most common bacteria causing pyoderma. Therefore pus for culture & sensitivity testing is essential to know causative organisms, drug sensitivity and resistance patterns which can help to select appropriate cost effective antibiotic & also to prevent bacterial resistance.

INTRODUCTION

Pyodermas are one of the common skin problems in dermatology clinics in India. Many cases now a day do not respond to the selected antibiotic that was previously effective. Perhaps, indiscriminate use of antibiotics has contributed to this situation. The emergence of antibiotic resistance has significantly poses a serious threat to public health (Gurumohan singh *et al*, 2010).

For the successful treatment of pyodermas, various causative organisms and their sensitivity patterns in local area is essential. The present study was an attempt to find out the causative organisms and their antibiotic susceptibility patterns in pyodermas in the Dermatology department (DVL) in a tertiary care hospital.

MATERIALS AND METHODS

The present study is cross sectional hospital based study comprising of 100 cases reported to the Dermatology department included outpatients & inpatients at MIMS for a period of one year. Patient's clinical profiles were recorded. All ages, patients with purulent discharge & untreated were included in the study. Those who are on antibiotic therapy & denied consent were excluded. The majority are from rural background and low socio economic group. Swabs were collected under aseptic conditions & were transported to the microbiology laboratory for culture and sensitivity testing to know organism responsible and appropriate sensitive antibiotic. The swab was inoculated on blood agar and MacConkeys medium, incubated at 37^{o} C for 24hrs. Growth was identified based on culture characteristics. Antibacterial sensitivity testing was done by Bauer Kirby method using Mueller Hinton agar

Corresponding author:* **Janardhan. B
Department of Dermatology, Venereology & Leprosy (DVL), Mediciti Institute of Medical Sciences (MIMS)

plate supplied by Himedia. Discs containing various drugs with concentration used are Amikacin(10mcg), Ampicillin(25mcg), Amoxycillin(25mcg), Amoxyclav-Amoxicillin+Clavulanic acid (50/10mcg), Amikacin(30mcg), Piperacillin+Tazobactum(100/10mcg) Ceftriaxone(10mcg), Ceftazidime(10mcg), Cefepime(50mcg), Chloramphenicol(50mcg), Doxycycline hydrochloride(10mcg), Erythromycin(10mcg), Gentamicin(50mcg), Lomefloxacin(15mcg) (CLSI, 2012) Statistical analysis was done. Ethical approval was taken from the institution.

Observations & Results

The present study comprised of 100 patients with pyoderma skin lesions, of which 66 cases were primary Pyoderma and 34 are secondary pyoderma. (table 1) Among the primary pyoderma, Impetigo contagiosa(17%) (figure 1) was the most common clinical type followed by Folliculitis(16%), Furunculosis(15%)(figure 3), Paronychia(7%), Cellulitis(5%), Bullous impetigo(4%) & Carbuncle(2%).(table 2) Among the secondary Pyoderma, Eczema with secondary infection(13%) was most common followed by infected wound(12%), Scabies with secondary infection(6%)(figure 2), Hidradenitis Suppurativa(2%) & Pemphigus vulgaris(1%).(table 3)

Clinical Diagnosis of Pyodermas

Table no 1

S.no	Clinical Diagnosis	No of cases (n = 100)
01	Impetigo contagiosa	17
02	Folliculitis	16
03	Furunculosis	15
04	Eczema with secondary infection	13
05	Infected wound	12
06	Paronychia	07
07	Scabies with secondary infection	06
08	Cellulitis	05
09	Bullous Impetigo	04
10	carbuncle	02
11	Hidradenitis supparativa	02
12	Pemphigus vulgaris	01

Primary Pyoderma

Table 2

S.no	Clinical Diagnosis	Total No of cases (66)
01	Impetigo contagiosa	17
02	Folliculitis	16
03	Furunculosis	15
04	Paronychia	07
05	Cellulitis	05
06	Bullous impetigo	04
07	Carbuncle	02

Secondary Pyoderma

Table no 3

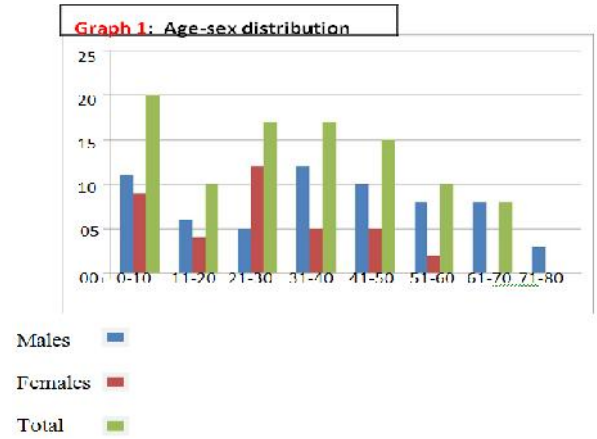
S.no	Clinical Diagnosis	Total No of cases (34)
01	Eczema with secondary infection	13
02	Infected wound	12
03	Scabies with secondary infection	06
04	Hidradenitis suppurativa	02
05	Pemphigus vulgaris	01

AGE- SEX Distribution

Of the 100 cases, 60 (60%) were males and 40 (40%) cases are females. The male & female patient ratio is 3:2 (table 4 & graph 1) The age group in which Pyodermas occurred most frequently are below 10 years (20%) followed by 21-30 (17%) and 31-40 years age group (17%) and 41-50(15%). Half of total cases are in age group between 21-50 years. Pyodermas were less commonly in age group 61-70 (8%) and 71-80 (3%).

Table no 4

Age group (years)	Males	Females	Total
00-10	11	09	20
11-20	06	04	10
21-30	05	12	17
31-40	12	05	17
41-50	10	05	15
51-60	08	02	10
61-70	08	00	08
71-80	03	00	03
Total	63	37	**100**



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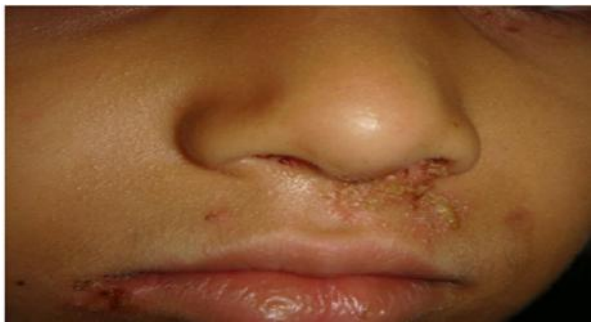

Figure 1

Case of Impetigo contagiosa

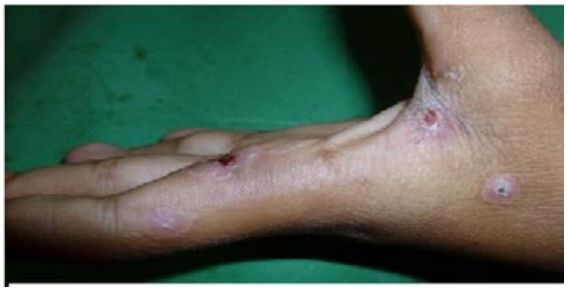

Figure 2

Case of Infected Scabies

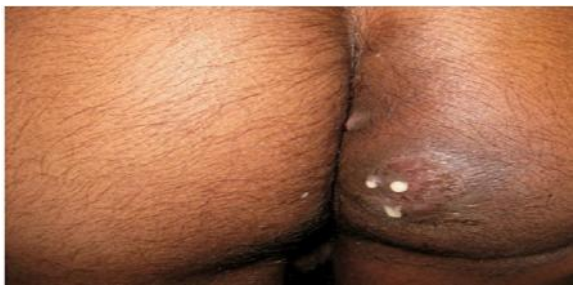

Figure 3

Case of Furunculosis

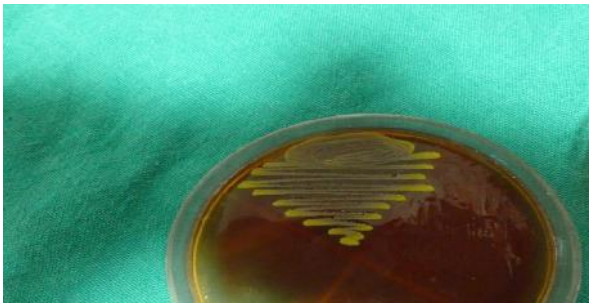

Figure 4

Staphylococcus growth on Blood agar

Figure 5

Growth on MacConkey's and Blood agar

Figure 6

Antibiotic sensitivity test on Muller Hinton agar

Gram Stain Results

Gram stain test shown positive in 86 samples out of 100, among which 60 samples were Gram positive and 26 samples gram negative.(Table no 5) Statistically significant with *p* value of 0.00000138($p < 0.05$) by applying chi square test.

Table no 5

Sample size	Gram stain +ve	Gram stain –ve	Gram +ve org	Gram –ve org
100	86	14	60	26

Culture Results

Table no 6

Sample size	Growth +ve	Mixed org	No growth
100	88	04	12

Out of 100 samples, only 88 samples (88%) yielded organisms on culture and 12 (12%) samples did not yield any organisms. Single organism's growth was in 84 samples (84%) and in 4 samples (4%) mixed growth is seen.(table no 6)

Organisms Isolated From Different Types Of Pyodermas

Table no 7

S.no	Organism isolated	Total No.
01	Coagulase positive Staphylococcus aureus	39
02	Coagulase negative Staphylococci aureus	14
03	Pseudomonas	07
04	Escherichia coli	06
05	Proteus	06
06	Enterococci	05
07	Klebsiella	04
08	Acinetobacter	02
09	Citrobacter + Enterococci	01
10	Citrobacter +Staphylococcus	01
11	Streptococcus and Staphylococcus	01
12	Enterococci +Staphylococci	01
13	Citrobacter	01
14	No growth	12

Out of total 100 cases, 39 cases (39%) yielded growth of coagulase positive Staphylococci (Staphylococcus aureus)(figure 4 & 5) and 14 cases (14%) yielded growth of coagulase negative staphylococci, 6 cases (6%) Escherichia coli, 7 cases (7%) Pseudomonas, 4 cases (4%) yielded mixed organisms, 12 cases (12%) no organisms isolated. Other organisms isolated in least no. of cases are Enterococci, Klebsiella, Proteus, Acinetobacter & Citrobacter species. (table no 7) Enterococci, a Gram positive diplococcic which is commensals in human intestine. Acinetobacter and Citrobacter both are Gram negative organisms found in soil & water, whereas latter can even present in human intestine. Growth of these organisms could be due to contact with contaminated water.

Antibiotic Susceptibility Pattern-Staphylococci *Aureus* Coag +Ve/-Ve(53 Cases)

Coagulase positive staphylococcus aureus isolated from various specimens is sensitive to Amoxicillin+Clavulanic acid, Vancomycin, Piperacillin+Tazobactum, Doxycyclin, Ceftriaxone & resistant to Lomefloxacin, Ceftazidime, Erythromycin, Cefuroxime.(figure 6) Coagulase negative staphylococci are sensitive to Doxycyclin, Erythromycin, Cefepime, and Ceftriaxone and resistant to Amoxicillin, Lomefloxacin, Gentamicin, and Oxacillin. Klebsiella species shows sensitivity to Ceftazidime / Clavulanic acid, Cefepime And resistant to Ampicillin. Pseudomonas species shows sensitivity to Ceftazidime / Clavulanic acid, Cefepime and

resistant to Ampicillin. Enterococci isolated from various specimens shows sensitivity to Erythromycin, Amikacin and resistant to Ceftazidime, Amoxicillin. Citrobacter shows sensitive to Chloramphenicol, Doxycyclin and resistant to Amoxicillin & Amoxyclav. E. coli shows sensitivity to Cefepime, Ceftriaxone. Acinetobacter shows sensitivity to Doxycyclin, Chloramphenicol & resistant to Gentamicin, Ceftazidime.(table no 8)

Table no 8

Antibiotics	Sensitive		Resistant	
Amoxicillin+clavulanic acid	30	(56.6%)	23	(43.4%)
Ampicillin	00		53	(100%)
Vancomycin	14	(26.42%)	39	(73.58%)
Oxacillin	04	(7.5%)	49	(92.5%)
Pipercillin+tazobactum	21	(39.62%)	32	(60.38%)
Ceftriaxone	13	(24.53%)	40	(75.47%)
Cefixime	13	(24.53%)	40	(75.47%)
Cefoperazone	05	(9.43%)	48	(90.57%)
Ceftazidime	00		53	(100%)
Erythromycin	02	(3.77%)	51	(96.23%)
Lomefloxacin	00		53	(100%)
Amkicacin	07	(13.2%)	46	(86.8%)
Gentamicin	00		53	(100%)
Doxycycline	10	(18.87%)	43	(81.13%)

DISCUSSION

The present study of Pyodermas was conducted at MediCiti Institute of Medical Sciences, with sample size of 100 patients for period of one year. All out-patients & in-patients reported to Dermatology OPD were considered. In the present study males (60%) were more than females (40%). Male to female ratio was 3:2. Similar findings were observed by Shashi Gandhi *et al*, (2012) Malik Muhammad Hanif *et al*, (2006) Nagamoti *et al*, (1999) and Suresh K Malhotra *et al*, (2012). Whereas Kar *et al*, (1985) studied on 200 cases. However, Mathew *et al*, (2012), Ramani and Jayakar *et al*, (1980) & Parikh *et al*, (1987) observed female preponderance. Most of the Pyodermas were observed in age group below 10 years followed by 21-30 years. Similar findings were observed by other workers Shashi Gandhi *et al*, (2012) Mathew *et al*, (1992) who studied in paediatric patients & observed most of the Pyodermas in 1-4 years age group (54.2%), followed by 5-8 years. Most of the cases were reported in hot humid season & were common in low socio-economic group. Similar observation was made by Shashi Gandhi *et al*, (2012)

The clinical diagnosis of 100 cases shown, 66 cases were primary Pyodermas and 34 cases secondary Pyodermas. Similar close finding were observed by Kakar *et al*, (1999) among children with primary Pyodermas in 72% and secondary Pyodermas in 28% of cases.[9] Impetigo formed the largest clinical group in primary Pyodermas with 21 cases of which, 17 were non-bullous impetigo and 4 bullous impetigo. In most of the previous studies the predominant clinical presentation was Impetigo contagiosa. Other primary Pyodermas noted were folliculitis 16, furunculosis 15, paronychia 7, cellulitis 5, and carbuncle 2cases. These findings were in consistence with majority of studies like Kakar *et al*, (1999) Mariette Mathew *et al*, (1992) Shashi Gandhi *et al*, (2012) and Suresh K Malhothra *et al*, (2012) whereas study done in Mumbai by Patil *et al*, (2006) shown predominance of folliculitis and furunculosis of 58.8% and 33.3% respectively of total 86 cases. In case of secondary Pyodermas, Eczema with secondary infection (13 cases) was the most common followed by infected Wound (12 cases), Scabies with secondary infection (6cases), Hidradenitis Suppurativa (2cases) & Pemphigus vulgaris (1case) only. Bhaskaran *et al*, (1989) & Parikh *et al*, (1987) observed Scabies with secondary infection as most common secondary pyoderma. Most of the Pyodermas cases reported during hot and humid conditions. Overcrowding and poor hygiene are implicated in their causation. Similar findings were observed by Mathew *et al*, (1992) & Kaker *et al*, (1999). Ghadage & Sali *et al*, (1999) done study on 542 cases and noticed closed observations.

In microbiologic studies, out of 100 cases, 88 samples yielded organisms and 12 samples were sterile. Of the positive cultures, 84 yielded single organisms whereas 4 showed mixed growth. Streptococcus was isolated in only one case as a mixed growth with Staph aureus. Coagulase positive Staphylococcus was isolated in 39 cases and coagulase negative staphylococcus in 14 cases. Parikh *et al*, (1987) however observed coagulase positive Staphylococcus aureus from 97% of cases & coagulase negative Staphylococcus from 3% of case. Khalil Ahmed *et al*, (1998) reported Staphylococcus aureus from 90 cases (52.6%) followed by beta-haemolytic streptococci from 27 cases (15.7%) and mixed organisms in 26 cases (13%). Adarsha Chopra *et al*, (1994) noted coagulase positive Staphylococcus from 73.73% of cases, beta haemolytic streptococcus from 7.07% of cases and mixed organisms from 7.07% cases. Kakar *et al*, (1999) reported Staphylococcus aureus from 48% of cases, beta- haemolytic streptococci from 36% of cases, combination of both was obtained from 16 % of cases. Shashi Gandhi *et al*, (2012) isolated Staphylococcus aureus in 155 cases (77.5%) followed by beta-haemolytic streptococci in 6 cases (3%). Pasricha *et al*, (1974) isolated Staphylococcus aureus from 68% of cases, beta- haemolytic streptococcus from 5% and both organinsms from 17% of cases. Whereas Mallik *et al*, (2006) had reported isolation of streptococci more than staphylococci. Other organisms isolated in this study are Pseudomonas from 7 cases, Proteus from 6 cases, Enterococci from 5 cases, Klebsiella from 4 cases, Acinetobacter from 2 cases, Citrobacter + Enterococci from 1 case, Citrobacter + Staphylococcus aureus from 1 case, Enterococci + Staphylococcus from 1 case, Citrobacter from 1 case.

On culture out of 100 samples, 88 samples shows growth, of which 60 were Gram positive, 26 Gram negative and 2 were mixed organisms. In this study, coagulase positive Staphylococcus (Staphylococcus aureus) was the main causative organism for impetigo, followed by with coagulase negative Staphylococci. These findings were in agreement with reports of other studies. Malik Muhammad Hanif *et al*, (2006) incriminated beta- haemolytic streptococcus as the main etiological agent of impetigo. Of the 16 cases of folliculitis observed, 6 were due to Staphylococcus aureus, 1 due to coagulase negative staphylococcus and 2 were due to Proteus species. In 6 cases no organism was isolated. In furunculosis, carbuncles, paronychia and cellulitis coagulase positive staphylococcus was the most common organism isolated and is in agreement with others. In secondary Pyodermas, most of the cases were caused by Staph. aureus and coagulase negative staphylococcus. Out of 39 cases of coagulase positive

staphylococci, high sensitivity to Amoxicillin + Clavulanic acid was observed followed by Doxycyclin, Amikacin, Piperacillin / Tazobactam, Vancomycin, Ceftriaxone and Cephalexin. Specimens were generally resistant to Lomefloxacin, Ceftazidime, Erythromycin, Cefoxitine and Cefuroxime. Among coagulase negative Staphylococcus aureus shown sensitivity to Doxycyclin followed by Erythromycin, Cefepime, Piperacillin / Tazobactam & resistant to Amoxicillin, Lomefloxacin, Gentamicin and Oxacillin. Bhaskaran *et al*, (1989) & Parikh *et al*, (1987) observed Erythromycin as most effective drug. Ramana *et al*, (2008) reported that *S. aureus* was 100% sensitive to vancomycin, gentamicin, ciprofloxacin, and 81% and 8% sensitive to cefdinir and ampicillin, respectively.

Klebsiella and Pseudomonas species were sensitive to Ceftazidime/ Clavulanic acid and Cefepime; resistant to Ampicillin. Enterococci were sensitive to Amikacin and Erythromycin; resistant to Amoxicillin and Ceftazidime. Citrobacter was sensitive to Doxycyclin and Chloramphenicol; resistant to Amoxicillin. E.coli was sensitive to Cefepime & Ceftriaxone. Acinetobacter was sensitive to Doxycyclin and Chloramphenicol; resistant to Gentamicin and Ceftazidime.

CONCLUSION

In conclusion this study gives an indication of present state of Pyodermas in and around Medchal, where rural population is dominant. Male preponderance was seen with common age group affecting under 10 years. Impetigo was common clinical condition observed, followed by folliculitis, furunculosis & others. Staphylococcus aureus was common organism isolated from pyoderma skin lesions. In this study antibiotic sensitivity pattern showed Doxycycline was effective for most of the organisms. With the knowledge of likely causative organisms and their sensitivity patterns, proper cost effective antibiotic therapy can be selected for better treatment, avoiding unnecessary medications and prevention of drug resistance.

References

1. Adarsh Chopra, Ramesh Puri, R.R.Mittal, Shashikanta,(1994). A Clinical and Bacteriological study of Pyodermas, *Ind J dermotol venereal leprol*;60:200-202
2. Bhaskaran CS, Rao PS, Krishna Murthy T, (1989): Bacteriological study of Pyodermas. *Ind J dermotol venereol leprol* ;45:162-170.
3. Central Laboratory Standards Institute (CLSI) Performance standards for antimicrobial disc susceptibility tests, Approved standards. (11th edt) 2012;32(1)
4. DP Ghadage, YA Sali, (1999). Bacteriological study of Pyoderma with special reference to antibiotic susceptibility to newer antibiotics. *Ind J dermotol venereol leprol*;65:177-181.
5. Gurumohan singh, Vineeth kaur, Sanjay singh. Bacterial infections, Indian Association of Dermatologist, Venereologist & Leprologists (IADVL), Textbook of Dermatology, 3rd Edit, Bhalani publishing house, Mumbai. 2010. vol(1):223-235
6. Kakar, N., Kumar, V., Mehta, G., Sharma, R.C., Koranne, (1999), Clinico-bacteriological study of pyodermas in children, R.V. *Journal of Dermatology*; 26(5):288-293
7. Kar PK, Sharma NP, Shah BH, (1985). Bacteriological study of pyoderma in children. *Indian J Dermatol Venereol Leprol*;5:325–7.
8. Khalil Ahmed, Asheesh Batra, Renu Roy, G Kalla, Kh, (1998). Clinical and bacteriological study of Pyoderma in Jodhpur-Western Rajasthan (le). *Ind J dermotol venereol leprol*; 64:156-157.
9. Malik Muhammad Hanif, Tariq Butt, Mohammad Amjad Pathogens involved and antibiotic sensitivity pattern of isolates in community acquired common bacterial Skin infections, Department of Dermatology and Pathology, Combined Military Hospital Peshawar. 2006; 3
10. Mathew S M, Garg B R, Kanungo R, (1992). A Clinico-bacteriological study of primary pyodermas of children in Pondicherry. *Indian J Dermatol Venereol Leprol*;58:183-187.
11. Nagmoti JM, Patil CS, Metgud SC, (1999). A bacterial study of pyoderma in Belgaum. *Indian J Dermatol Venereol Leprol*;65:69–71.
12. Parikh DA, Fernandez RJ, Wagle UD, (1987). Clinical and bacteriological aspects of Pyoderma. *J Post grad Med* ;33:189
13. Pasricha A, Bhujwala RA, Srinivas, (1972); Bacteriological study of Pyodermas, Pathol Bacteriol,; 15: 131-138
14. Patil R, Baveja S, Nataraj G, Khopkar U, (2006). Prevalence of Methicillin-resistant Staphylococcus aureus (MRSA) in community-acquired primary Pyoderma. *Indian J Dermatol Venereol*;72:126-22
15. Ramana KV, Mohanty SK, Kumar A, (2008). In-vitro activities of current antimicrobial agents against isolates of pyoderma. *Indian J Dermatol Venereol Leprol*;74:430.
16. Ramani TV and Jayakar PA, (1980): Bacteriological study of 100 cases of Pyodermas with special reference to Staphylococci, antibiotic sensitivity and phage pattern. *Ind J Dermatol Venereol Leprol*;46:282-28
17. Shashi Gandhi, A K Ojha, K P Ranjan, and Neelima, (2012). Clinical and Bacteriological Aspects of Pyoderma N *Am J Med Sci*; 4(10):492–495
18. Suresh K Malhotra, Sita Malhotra, Gurjit S Dhaliwal, Alpna Thakur, (2012) Bacteriological study of pyodermas in a tertiary care dermatological center;57(5):358-361
19. Tushar DS, Tanuja DJ, DPS, Dipa DN, (2012). Clinic bacteriological Study of Pyoderma with Special Reference to Community Acquired Methicillin Resistant Staphylococcus aureus. *NJIRM*; 3(1):21-25

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