



## Characterization of Necrotizing Fasciitis Caused By *streptococcus Pyogenes* among Children in Funtua Local Government Area of Katsina State

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### ABSTRACT

*Streptococcus Pyogenes* causes serious damages to the human tissues which is known as Necrotizing fasciitis. It is an invasive infection often seen in combination with streptococcal toxic shock syndrome, which further increase morbidity and motility. About 50 swabs (wound) sample were collected from children between 1-15 years old and were analyzed and identified using Gram staining. 31 were male, while the remaining 19 were female patients, all from the General Hospital Funtua, Katsina state. The result shows that about 7(14%) of the samples were positive to *S. pyogenes*, out of which 2(4%) are female and 5(10%) are male. The result also reveals that most age group that were infected were between 11-15 years old. The incidence found in relation to demographic characteristics of the parents of the children shows that the lower class has the highest infection rate of 86% compared with middle class and higher class both of 10% and 4% respectively. It was speculated that poor hygiene and socio-economic status have contributed in the dissemination of the menace. It was recommended that proper awareness and campaign on personal hygiene should be intensified by the health personnel to communities, this will go a long way in checking the menace. Finally, early treatment with antibiotics can be used for prevention of minor wounds, then proper symptoms monitoring should be done.

**Keyword:** Necrotizing Fasciitis, Swab, *Streptococcus*, Pathogens, Morbidity, Syndrome.

### INTRODUCTION

Necrotizing fasciitis otherwise (Flesh-eating bacteria) cause a serious damage to flesh. A serious bacterial infection that destroys tissue under the skin. Flesh-eating disease occurs when bacteria enter the body through a break in the skin (Noel T. P. et al., 2005). People with a weakened immune system can be at greater risk of developing this condition. The condition spreads quickly. Symptoms include blisters, fever, fatigue and pain worse than a person would expect based on the wound's appearance. Treatment involves immediate delivery of IV antibiotics. Surgical removal of dead or infected tissue from the wound is often required. Early symptoms of necrotizing fasciitis can include: a red, warm, or swollen area of skin that spreads quickly, Severe pain, including pain beyond the area of the skin that is red, warm, or swollen and Fever (Silberg M. E. et al., 2009). To get necrotizing fasciitis, you need to have the bacteria in your body. This typically occurs when the skin is broken. For example, the bacteria can enter your body through a cut, scrape, or surgical wound. Several types of bacteria cause necrotizing fasciitis *Streptococcus pyogenes* is a member of the Group A beta-hemolytic *streptococci* (Jim Dwyer, 2012). A group of bacteria that is responsible for mild cases of sore throat, and skin infections, as well as severe illness such as toxic shock syndrome and necrotizing fasciitis (Charmaine A. et al., 2006). Like other cocci, *Streptococcus pyogenes* are round bacteria. The name derives from Greek word 'Streptos' meaning twisted chain because *streptococcal* cells tend to link together in chain, which resembles a string of pearl when viewed under microscope. (Bisno A.L. and Steven D.L., 2000). Early medical treatment of the infection is often presumptive; thus antibiotics should be started as soon as the condition is suspected. Initial treatment often includes a combination of intravenous antibiotics before cultures are taken to determine the appropriate antibiotics to administer. (Anderson T. and Rodney P., 2009, Anderson W., 2009) Treatment involves immediate delivery of IV antibiotics. Surgical removal of dead or infected tissue from the wound is often required, in most cases, the term flesh eating bacteria has been applied to describe infection caused by the bacterium *Streptococcus pyogenes*. (Mooh S. et al., 2013, Mandor B.I. et al., 2013). When they live on top of your skin, they are harmless, but once they find their way into the body, they cause severe damages. (Walker M.J., 2010). The term flesh eating bacteria has been used because the bacterial infection produces toxin that destroys tissues such as muscle, skin and fat. *S. pyogenes* is a species of Gram positive, aerotolerant bacterium in the genus *Streptococcus*. These bacteria are extracellular, and made up of non-motile and non-spore forming cocci. It is clinically important for humans. It is an infrequent, but usually pathogenic part of the skin microbiota. It is the predominant species harboring the lancefield group A antigen, and often called group A *Streptococcus* (GAS). The scientific classification of *S. pyogenes*; Domain: Bacteria, Phylum: Firmicutes, Class: Bacilli, Order: Lactobacillales, Family: Streptococcaceae, Genus: *Streptococcus*, Species: *S. pyogenes*. (Ravdas A. et al., 2013).

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## MATERIALS AND METHODS

### Materials:

#### The Materials needed for this work are;

- i. Sterile swab stick
- ii. Wire loop
- iii. Bunsen flame/ candle
- iv. Marker
- v. Slide
- vi. Iodine
- vii. Crystal violet
- viii. Alcohol
- ix. Safranin
- x. Nutrient agar
- xi. Chocolate agar
- xii. Culture plate
- xiii. Hydrogen peroxide
- xiv. Incubator
- xv. Autoclave
- xvi. Disposable hand gloves

### PREPARATION OF CULTURE MEDIA

The Culture media was prepared according to Ochei, J. and Kolhatkar A. 2007.

### METHODS

#### Culture

1. Using the swab of the specimen, the inoculum (culture or specimen) was applied to a small area of the plate.
2. The loop was Sterilized in the Bunsen flame, after its cooled, streak or thin out the inoculum over area two.
3. The procedure was Repeated over areas 3,4 and 5.
4. The medium was Incubated at 37°C for 24 hours (Ochei, J. and Kolhatkar A. 2007)

#### Preparation of smear

1. The wire loop was sterilized in Bunsen flame.
2. One drop of sterile saline was placed on a clean slide with the sterilized loop.
3. The loop was re-sterilized.
4. A small portion of bacterial growth was picked and emulsified in the drop of saline and spread to give a thin homogeneous film or smear on the slide.
5. The smear was allowed to dry in air, fixed and stained. (Ochei, J. and Kolhatkar A. 2007).

#### Staining Method

1. The smear was allowed to dry and then fix with gentle heat by passing the slide two or three times over a Bunsen flame.
2. It was then stained with crystal violet for one minute and washed with running tap water.
3. Lugol's iodine was applied and then leave for one minute after which it was washed with tap water.
4. The smear was then de-colourised briefly with acetone and washed immediately with tap water.
5. It was then counter stained with 1% neutral red for one minute and then washed with tap water.
6. The smear was allowed to air dry and was examined microscopically using oil immersion lens (Ochei, J. and Kolhatkar A. 2007).

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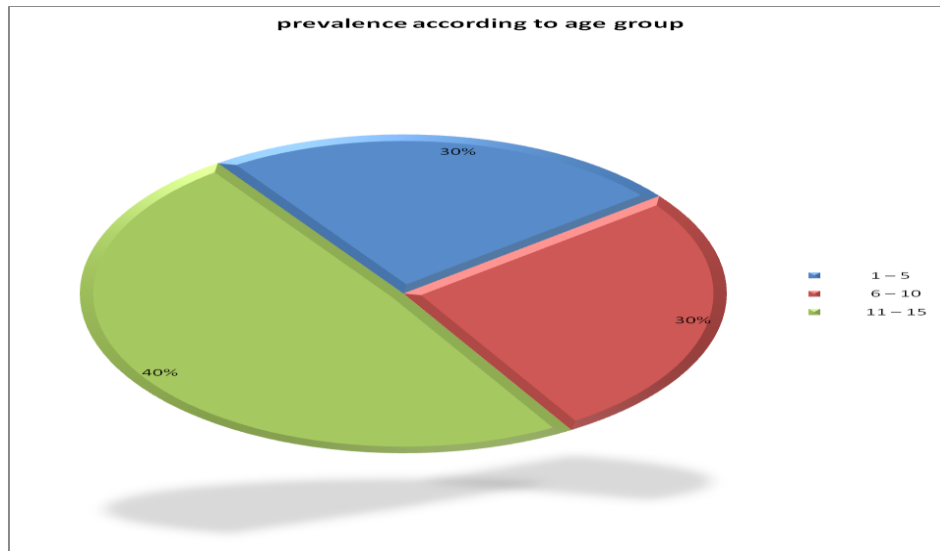
## RESULTS AND DISCUSSION

### RESULTS

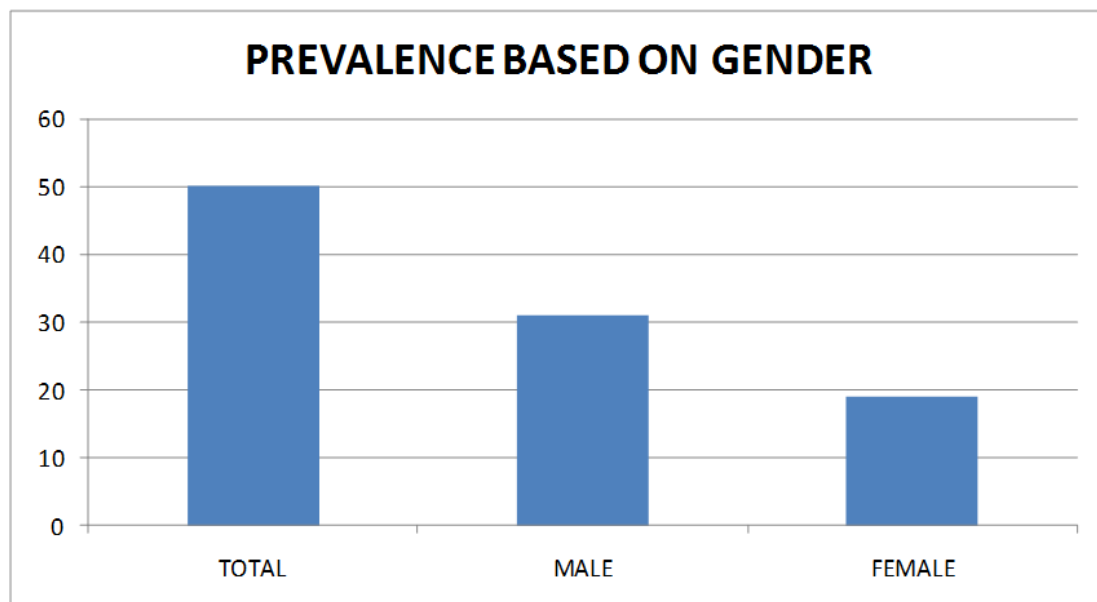
The research was carried out among 50 patients aged 1-15 years out of which 43 were considered and data was obtained from the respective patients and presented in tables below. The age distribution of the 50 patients whose swab samples were analyzed in the study is presented in Table 1 and figure 1 below. The mean age  $\pm$  standard deviation (range) of the patients was  $6.6 \pm 1.5$  (1.0 - 15) years. The gender distribution of the 50 patients whose swab samples were analyzed in the study is presented in Table 2 and the figure 2 below. The overall prevalence of *S.pyogenes* in the patients whose swab samples were analyzed in the study is presented in table 3, and the socio demographic status of the 50 patients is presented in figure 3.

**TABLE 1: PREVALENCE ACCORDING TO AGE GROUP OF PATIENTS**

Age (Years)	No. of Swab Sample	No. of S.pyogenes ISOLATED	Prevalence (%)
1-5	13	2	30
6-10	13	2	30
11-15	17	3	40
TOTAL	43	7	100

**Figure 1: prevalence according to age group****TABLE 2: PREVALENCE OF S. PYOGENES BASED ON GENDER**

Gender	No. of Swab Sample	No. of S. Pyogenes	Prevalence (%)
MALE	26	5	62
FEMALE	17	2	38
TOTAL	43	7	100

**Figure2: Incidence of *Streptococcus pyogenes* among children in relation to gender**

**TABLE 3: OVERALL PREVALENCE OF STREPTOCOCCUS PYOGENES AMONG PATIENTS IN THE STUDY**

Age group (years)	MALE			FEMALE			TOTAL		
	No. of swab samples	No. of <i>S.pyogenes</i> isolated	%	No. of swab samples	No. of <i>S.pyogenes</i> isolated	%	No. of swab samples	No. of <i>S.pyogenes</i> isolated	%
1-5	8	1	18	8	1	18	16	2	36
6-10	9	1	20	3	1	8	12	2	28
11-15	9	3	24	6	0	12	15	3	36
-TOTAL	26	5	62	17	2	38	43	7	100

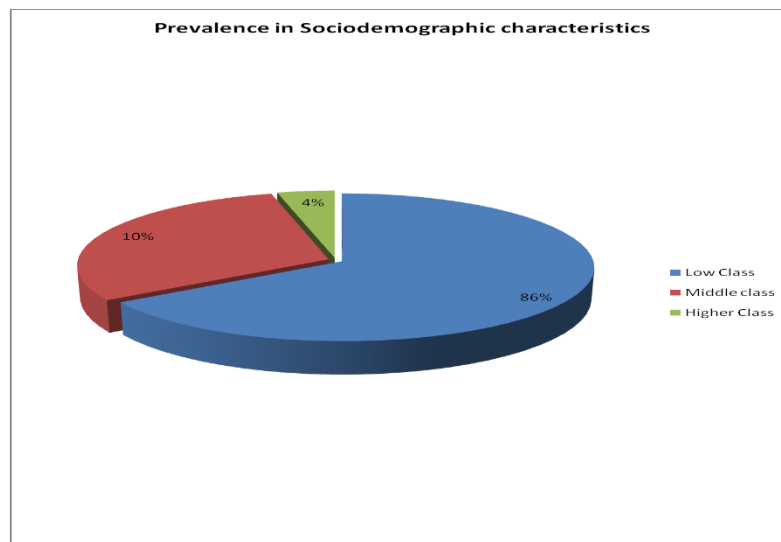


Figure 3: Prevalence in Sociodemographic characteristics

## DISCUSSION OF FINDINGS

Infections of necrotizing fasciitis caused by *S.pyogenes*, was reported in a study that approximately 6% of streptococcal cases in children progresses to acute renal failure and that approximately 2% die of this complication in the country. Prompt and correct diagnosis is essential in examining the occurrence and rate of *Streptococcus pyogenes* in Necrotizing fasciitis patients. In this research conducted at Sark in Maska Shehu Hospital Funtua (SMSHF), Katsina state, a total of 50 swab were analyzed for the presence of *Streptococcus pyogenes*, among the prevalent bacterial infection in children and constitute 14% of all cases of Necrotizing fasciitis. In terms of gender distribution Male are almost equally affected by *S.pyogenes*, as 2 (4%) were from female, whereas 5 (10%) were from male. In this study, 14% out of 50 patients were found to be positive for *S.pyogenes*. The overall result of this studies shows that among 50 of the patients that their samples were studied, 19(38%) were female, while 31(62%) are male. *S.pyogenes* was isolated from only 7 samples out of the 50 samples. Also among the isolates, 2 (4%) were from female, whereas 5 (10%) were from males, The Highest number of infection was found in the age group 11 -15 years (40%)

## Conclusion

The result of this study reveals relatively low incidence of Necrotizing fasciitis infection among children attending Sark in Maska Shehu Hospital Funtua with overall percentage of 14%. With both genders at risk of which children between age of 11 to 15 were at the high risk of infection by *Streptococcus pyogenes*. Necrotizing fasciitis is severe infection with prominent cutaneous features that can compromise life if diagnosis and treatment are delayed. This infection could be prevented and treated when detected early. One should ensure that the infection site must be thoroughly cleaned,

disinfected and monitored. Also environmental hygiene is needed to prevent the high occurrence of Necrotizing fasciitis caused by *S.pyogenes* especially for people living in the communities where there is poor sanitation. Necrotizing fasciitis is largely preventable disease. prevention will involve a multi-disciplinary commitment and action by individuals, Health personnel and policy makers.

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