

A Prospective Cross-Sectional Study On Bacteriology Of Smegma Among Male In Selangor

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Abstract

Introduction: Smegma is the end result of dead skin cells and fatty oils primarily shed from certain parts of our genitalia. Several studies have shown that there are bacteria isolated in the male's smegma, thus this study aims to discover the presence of bacteria in the smegma of male in Selangor, the types of bacteria in the smegma and to determine the sensitivity of antibiotic toward each type of bacteria.

Methods: A cross-sectional study was done where data was collected through consecutive sampling. Any male who undergone circumcision in MyMedik Circumcision Centre, meet all the inclusion criteria and does not adhere to the exclusion criteria will be selected as participant. A swab from smegma sample was taken and were subjected to bacterial analysis, gram staining and antibiotic sensitivity testing.

Results: Among 51 participants, 94.1% of them had mixed growth and 5.9% of them had no pathogen isolated. Within gram positive, *Enterococcus* sp. (25%) is the most common isolated organism while for gram negative, *Klebsiella* sp. (14.6%) is the most common isolated organism found. For antibiotic sensitivity, 100% of *Klebsiella* sp. and *Enterobacter* sp. are sensitive to Cotrimoxazole, Cefotaxime and Ceftazidime. 100% of *Escherichia coli* sensitive towards Ampicillin-Sulbactam. *Enterococcus* sp. is 100% sensitive towards Ampicillin, Teicoplanin and Linezolid while 100% of *Staphylococcus aureus* are sensitive to Vancomycin.

Conclusion: Majority of male in Selangor were found to have pathogens in their smegma and it is largely contributed by gram negative bacteria. Based on the result, Ampicillin Sulbactam, Ceftazidime or Cefotaxime may be given as a prophylaxis prior to the circumcision.

Keyword: Smegma, bacteriology, antibiotics, sensitivity

INTRODUCTION

Smegma is defined as the end result of dead skin cells and fatty oils primarily shed from certain parts of our genitalia; the inner cavity of the foreskin in men and the folds of the labia minora and clitoris in women. But it's waxy, sometimes smelly. As we know, we excrete oil and water from our skin all the livelong day, and for good reason. The oily byproducts, known as sebum, coat our skin against microbial invaders and keep the skin waterproof. Likewise, smegma serves its

own purpose. Namely, it helps lubricates our genitals during sex. Particularly in uncircumcised men, it helps ensure that the foreskin can easily slide on and off the glans, or head, of penis without irritation ^[1].

Based on a study in year 2011 in Kano, Nigeria, the prevalence of bacteria isolated from smegma in prepubertal boys was 80.8%. There were 58% gram-positive bacteria and 42% of gram-negative bacteria isolated^[2]. The most commonly isolated gram-negative bacteria were *Escherichia coli* (95%), while the commonly isolated gram-positive bacteria were *Staphylococcus epidermidis* (44.8%) and *Staphylococcus aureus* (41.4%). According to another study in Turkey, there were 72% of healthy prepubertal boys who underwent a standard circumcision found to have bacteria isolated from the smegma^[3]. The organism isolates consist of 75% of gram-positive bacteria and 23.6% of gramnegative bacteria and 1.4% of *Candida*. The most commonly isolated gram-negative bacterium was *Escherichia coli* (41.2%), whereas the commonly isolated gram-positive bacterium was *Enterococcus sp.* (57.4%).

Therefore, this study aims to identify the most common types of bacteria found in smegma of male in Selangor and determine the sensitivity of antibiotics towards each type of bacteria.

MATERIALS AND METHOD

The cross-sectional study was done at Mymedik Circumcision Centre located in Kajang. A total of 51 males that underwent circumcision at Mymedik Circumcision Centre with no risk of infection have voluntarily agreed to participate in this study. Participants that did not adhere to the inclusion criteria and meet the exclusion criteria will be drop out from the study. Exclusion criteria includes patients who refused consent, personal or family history of keloid or hypertrophic scar formation, buried penis, bleeding disorders, revision circumcision, hypospadias, penoscrotal fusion, balanitis xerotica obliterans (BXO) and participants who consume antibiotic medication. Participants are allowed to withdraw at any time with prior notice.

For collection of smegma, the fold of skin that covers the head of the penis was retracted to expose the smegma. This was done in a sterile condition. Then, a swab was taken directly from the smegma and stored into the medium tubes. Medium tubes were labelled according to participants' details. The swabs were cultured in agar plate and the microorganism growth were identified using gram staining. Antibiotic sensitivity test using a range of gram positive and gram negative antibiotics were also analysed against the microorganism growth. Data collected were recorded and analysed using IBM SPSS Statistics 20 software.

RESULTS

The achieved sample of this study are 170%. All of them met the inclusive criteria and exclusive criteria of the sample population. Most of the participants are below 18 years old with percentage of 72.5% while 27.5% are above 18 years old. Among the participants, for race, Malay is the highest with percentage of 56.9% followed by Chinese (19.6%), others (17.6%) and Indian (5.9%)(Table I).

Table I : General Socio Demographic Data

| Socio-demographic data | Classification | Frequency (n) | Percentage (%) |
|------------------------|----------------|---------------|----------------|
| Age (years) | < 18 | 37 | 72.5 |
| | >18 | 14 | 27.5 |
| | Total | 51 | 100 |
| Race | Malay | 29 | 56.9 |
| | Chinese | 10 | 19.6 |
| | Indian | 3 | 5.9 |
| | Others | 9 | 17.6 |
| | Total | 51 | 100 |

Among 51 participants, 3 (5.9%) of them had no pathogen isolated, 42 (82.3%) of them had single organism and 6 (11.8%) of them had mixed growth (Table II).

Table II : Prevalence of Bacteria in the Smegma of Males in Selangor

| Presence of bacteria | | Frequency | Percentage (%) |
|----------------------|--------|-----------|----------------|
| Yes | Single | 42 | 82.3 |
| | Mixed | 6 | 11.8 |
| No | | 3 | 5.9 |
| Total | | 51 | 100.0 |

Among gram positive, *Enterococcus* sp. Is the most commonly isolated (25.0%) while the most common isolated gram negative is *Klebsiella* sp. (14.6%) and followed by *Escherichia coli* (12.5%) (Table 3).

Table III : Types of Bacteria in the Smegma of Males in Selangor

| Types of bacteria | Frequency | Percentage (%) |
|-------------------------------|-----------|----------------|
| <i>Staphylococcus aureus</i> | 2 | 4.2 |
| <i>Enterococcus</i> sp. | 12 | 25.0 |
| <i>Escherichia coli</i> | 6 | 12.5 |
| <i>Pseudomonas aeruginosa</i> | 2 | 4.2 |
| <i>Morganella morganii</i> | 1 | 2.1 |
| <i>Klebsiella</i> sp. | 7 | 14.6 |

| | | |
|---|----|-------|
| Klebsiella pneumoniae | 3 | 8.3 |
| Proteus sp. | 3 | 6.3 |
| Enterobacter sp. | 4 | 8.3 |
| Pseudomonas sp. | 1 | 2.1 |
| Methicillin-resistant Staphylococcus aureus | 1 | 2.1 |
| Group B streptococcus | 1 | 2.1 |
| Streptococcus | 1 | 2.1 |
| Klebsiella sp. + Proteus sp. | 1 | 2.1 |
| Pseudomonas sp. + Staphylococcus aureus | 1 | 2.1 |
| Escherichia coli + Enterobacter sp. | 1 | 2.1 |
| Escherichia coli + Proteus sp. | 1 | 2.1 |
| Total | 48 | 100.0 |

Gram negative bacteria is the most commonly found (62.5%) followed by gram positive bacteria (35.4%) and mix gram positive and gram negative (2.1%) (Table IV).

Table IV : Bacteria's Gram Staining in the Smegma of Males in Selangor

| Gram staining of bacteria | Frequency | Percentage (%) |
|---------------------------|-----------|----------------|
|---------------------------|-----------|----------------|

| | | |
|-------------------------------------|----|-------|
| Gram positive | 17 | 35.4 |
| Gram negative | 30 | 62.5 |
| Mix gram positive and gram negative | 1 | 2.1 |
| Total | 48 | 100.0 |

Results in table V shows that 100% of Klebsiella sp. And Enterobacter sp. are sensitive to Cotrimoxazole, Cefotaxime and Ceftazidime meanwhile 100% of Escherichia coli is sensitive to Ampicillin-sulbactam.

Table V : Sensitivity of gram-negative bacteria to antibiotics

| Antibiotic sensitivity (%) / Types of bacteria | Ampicillin | Amoxicillin | Cefuroxime | Cotrimoxazole | Cefotaxime | Ciprofloxacin | Ceftazidime | Ampicillin-sulbactam |
|--|------------|-------------|------------|---------------|------------|---------------|-------------|----------------------|
| Klebsiella sp. | 0.0 | 71.4 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 87.5 |
| E.coli | 37.5 | 71.4 | 83.3 | 75.0 | 87.5 | 87.5 | 87.5 | 100.0 |
| Enterobacter sp. | 20.0 | 100 | 80.0 | 100.0 | 100.0 | 80.0 | 100.0 | 100.0 |
| Proteus sp. | 40.0 | 100 | 100 | 75.0 | 100.0 | 75.0 | 100.0 | 100.0 |

Results in table VI indicated that 91.7% of Enterococcus sp. and 100% of Staphylococcus aureus are sensitive towards Vancomycin. In addition, 100% of Enterococcus sp. is sensitive to Ampicillin, Teicoplanin and Linezolid. For Staphylococcus aureus, 100% of them are sensitive to Oxacillin and Vancomycin.

Table VI : Sensitivity of gram-positive bacteria to antibiotics

| Antibiotic sensitivity (%) / Types of bacteria | Ampicillin | Penicillin G | Fusidic acid | Oxacillin | Erythromycin | Vancomycin | Teicoplanin | Linezolid |
|--|------------|--------------|--------------|-----------|--------------|------------|-------------|-----------|
| Enterococcus sp. | 100.0 | - | - | - | - | 91.7 | 100.0 | 100.0 |
| Staphylococcus aureus | - | 50.0 | 50.0 | 100.0 | 50.0 | 100.0 | - | - |

DISCUSSION

Prevalence of bacteria in smegma

Prepuce contains smegma might be colonized by microorganisms such as bacteria, virus and fungi^[4]. This could be the source of urinary tract infection and Human Papillomavirus (HPV) in male^[5]. There is surge of urinary tract infection case as the rate of circumcision decrease ($P < 0.02$)^[6]. Urinary tract infection is a vicious and unrecognized precursor of sepsis^[7]. Therefore, prevention from infection is very important and circumcision significantly reduce the risk of urinary tract infection^[8]. Based on our study, majority of male in Selangor were found to have bacteria in their smegma. It is supported by a study done which reports that among 52 Nigerian boys, 80.7% of their smegma swabs were positive for bacterial culture^[2]. Another study also reported that among 20 boys, 80% are having bacterial growth in their smegma^[9].

Types of bacteria in smegma

Based on our result, prevalence of gram negative organism found in smegma of male in Selangor is higher compared to gram positive. A study conducted by Anyanwu in Kano, Nigeria demonstrated a total of 29 gram-positives bacteria (58%) and 21 gram-negatives bacteria (42%) were found in a total of 50 bacterial isolates from smegma cultures^[2]. Gram negative bacteria are a serious problem in clinical setting because of its resistance towards antibiotics, it also the organism that infecting patients in ICU^[10]. In addition, half of critical sepsis and septic shock are caused by gram positive organisms^[11]. Urinary tract infection is a vicious and unrecognized precursor of sepsis^[6]. A study done in India shows that , 41.6% smegma were colonized with *Staphylococcus aureus*, 3.5% with *Enterococcus sp.*, 22.9% with a gram-negative bacterium (*E. coli*, *Klebsiella sp.*, or *Pseudomonas aeruginosa*), 1.6% with an anaerobe (*Clostridium*), 0.3% with a yeast (*Candida albicans*), and 60.0%

with any pathogen^[12]. This is corresponding with our study; most common gram positive organism found are *Staphylococcus aureus* and *Enterococcus* sp. while for gram negative, *Klebsiella* sp. and *E. coli* are commonly present in the smegma. *Klebsiella* sp. which is the most common found isolates found in our study is the one that prone to cause nosocomial outbreak since they are able to spread briskly^[13]. Bacteraemia due to *Staphylococcus aureus* and *Enterococcus* sp. usually followed by endocarditis which is associated with weight morbidity and mortality^[14-15]. However, with difference in diet and climate, the organisms may vary compared to other studies^[4,16].

Sensitivity of bacteria to different types of antibiotics

There is increase in vancomycin MIC in MRSA^[17]. Still, this fact does not happen in all cases. Based on our study where the percentage of *Staphylococcus* sensitive towards vancomycin is 100%. A study done in 2010 report that *Klebsiella* sp. was found to be most sensitive towards cefotaxime and cephalothin (100%), for *E. coli* and *Enterobacter* sp. it is most sensitive to ciprofloxacin by 83% and 87.5 % respectively and for *Enterococcus* sp. it has 90% sensitivity towards vancomycin^[18]. These results are consistent to our study which shows 100% sensitivity of *Klebsiella* towards cefotaxime, 87.5% sensitivity of *E. coli* towards ciprofloxacin, 80% sensitivity of *Enterobacter* sp. towards ciprofloxacin and 91.7% sensitivity of *Enterococcus* towards vancomycin. One isolate contains MRSA and as we all know; it is very challenging to treat MRSA due to its multidrug resistance characteristic^[19]. There are many factors that may contribute to the sensitivity towards antibiotics for; for example, antibiotic usage, the age of the patient, the antibiotic dosage and duration of treatment^[20].

CONCLUSION

Majority of male in Selangor were found to have pathogens in their smegma and it is largely contributed by gram negative bacteria (*Klebsiella* sp.). Ampicillin sulbactam may be given as a prophylaxis prior to the circumcision, as our study shows the antibiotics have the most sensitivity towards the gram negative bacteria. We also found the growth of fungi, namely *Candida* sp. in few of the smegma cultures. Thus, further study can be done to identify the sensitivity of the fungi to the antifungal. In a nutshell, circumcision is one of methods that can reduce the risk of urinary tract infection and the antibiotics sensitivity has been identified in order to determine a successful treatment for infection.

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