

# AUDIT OF DIAGNOSIS OF GONOCOCCAL INFECTION IN A GENITO URINARY MEDICINE (GUM) CLINIC

Sartaj Naeem, M N Khattak

*Department of Microbiology,  
City Hospital NHS Trust,  
Birmingham, UK.*

## ABSTRACT

**Objectives:** To study the efficacy of Gram stained smear in screening cases of gonorrhoea and comparing its sensitivity with culture of N gonorrhoea.

**Material and Methods:** Patients with gram smear positive or culture positive for N gonorrhoea from urogenital swabs were retrospectively analysed.

**Results:** In this study of 94 male and 49 females patients. The sensitivity of Gram stained smear and culture of N gonorrhoea were 92.56% and 98.94% respectively in male patient and 53.03% and 94.23% respectively in female patients.

**Conclusion:** Gram stain has a high sensitivity in detecting gonococcal infection in males while in females a considerably low sensitivity of gram stain necessitates the use of culture in diagnosing gonorrhoea.

**Key words:** Gonorrhoea, Gram staining, Culture.

---

## INTRODUCTION

Gonorrhoea is a common sexually transmitted infection primarily affecting the mucous membrane of the lower urogenital tract. Undetected infection in females can lead to unwanted sequelae such as pelvic inflammatory disease,<sup>1</sup> increased risk of

ectopic pregnancy,<sup>2</sup> tubal scarring, secondary infertility,<sup>3</sup> and chronic abdominal pain<sup>4</sup>. Disseminated infections,<sup>5</sup> neonatal conjunctivitis,<sup>6</sup> and acute epididymitis<sup>7</sup> in males are additional important consequences. Appropriate screening and improved detection will decrease these sequelae by prompting earlier recognition and treatment.

An audit of Laboratory diagnosis of gonorrhoea in a West Midland District General Hospital serving a semi-rural population was undertaken. The aim of the study was to ascertain the reliability of GUM clinic, Gram-stained smear in screening cases of gonorrhoea and comparing its sensitivity with culture method in diagnosing gonococcal infections. All patients attending the hospital's GUM clinic are screened routinely for Neisseria gonorrhoea by Gram-stain smear apart from screening for other sexually transmitted disease. Urogenital swabs are Gram-stained for intracellular diplococci. Swabs from such patients are immediately inoculated onto selective culture media and transported to the Hospital's Microbiology laboratory for identification and sensitivities.

## MATERIAL AND METHODS

All patients attending GUM clinic during a six month period (July-December 2000), who were either Gram-stained smear positive, or culture positive for Neisseria gonorrhoea from urogenital swabs were included in this retrospective study. Culture confirmed cases of gonococcal infection were identified from Microbiology laboratory computer records. They were cross-referenced with a list of patients with positive Gram-stained smear for the same period provided by the GUM clinic laboratory. The data was analyzed using Microsoft Excel as shown in table-1.

## RESULTS

A total of 94 male patients were identified as having gonococcal infection; 93 of these were based on growth on culture media, whereas, the remaining one case was positive on gram-stained smear (culture negative). Amongst the 93 culture-confirmed cases, 86 were also positive on preliminary Gram-stained smears. Four cases

were equivocal (+/-) on gram film, and one of these was positive on culture. Gram stained smear had a sensitivity of 92.56% to diagnose Neisseria gonorrhoea in men. This is in agreement with a recent study showing a sensitivity of 90.40%<sup>8</sup>. Culture of Neisseria gonorrhoea from urethral swabs had a sensitivity of 98-94% the main site of infection in males was urethra in 86 cases (92.47%). Gonococci were recovered from both urethra and rectum in 3 cases (323%). Concomitant co-infection with Chlamydia trachomatis was found in 28 cases (3-0.1%).

Amongst the 49 female culture positive cases, only 26 were Gram stained smear positive on initial screening. There were three cases, which were Gram stained smear positive, but subsequently showed no growth on laboratory culture media. Thirteen cases were equivocal (+/-) on Gram stain; only three were subsequently shown positive on culture. Gram stained smear in females had a significantly low sensitivity of 53.03%. Sensitivity of Gram stained

COMPARISON OF GRAM-STAINED SMEAR WITH CULTURE OF NEISSERIA GONORRHOEA ISOLATES OVER A SIX MONTHS PERIOD (JULY-DECEMBER 2000)

	Male	Female
No. of culture confirmed cases	93	49
No. of Gram-stained smear positive cases	87	26
Gram stain negative but positive on culture	06	20
Gram stain positive but negative on culture	01	03
No. of cases equivocal (+/-) on Gram film	04	13
* Positive on culture	01	03
* Negative on culture	03	10

TABLE-1

smear in females may be as low as 26.60%<sup>8</sup>. In contrast to Gram stain, culture of the swabs in females had a high sensitivity (94.23) in majority of female patients (71.42%). Simultaneous swabs taken from cervix, vagina and urethra were culture positive. In 16.32% cases, two sites were culture positive (cervix and urethra). Amongst the 23 gram stained smear negative cases, treatment was given on clinical grounds in 15 cases (65.22%), and treatment initiated after culture confirmation in 8 (34.78%) cases. Amongst the thirteen Gram stained smear equivocal (+/-) cases, were treated on clinical grounds. The details of these cases are shown in Table-1.

## DISCUSSION

Laboratory diagnosis of gonorrhoea depends on identification of *Neisseria gonorrhoea* at an infected site. Direct microscopy of the Gram-stained smear is widely used for the diagnosis of gonococcal infection, although it often requires an experienced microscopist for accurate diagnosis<sup>9</sup>. It is a useful test in situations where isolation by culture is impracticable due to lack of access to laboratory with culture capabilities or difficulty in transport<sup>10</sup>. It has a sensitivity of about 90% and a specificity of 99% in male patients<sup>11</sup>. In the present study, the sensitivity of microscopy was 92.54% for symptomatic male patients, Gram stain is sufficiently sensitive and specific to make culture confirmation optional, if susceptibility testing is not high priority, and medicolegal consideration are not prominent<sup>12</sup>. However, Gram staining should not be used as a sole method to diagnose infection of the rectum, pharynx or other sites as it may lead to erroneous results.

Isolation by culture is the diagnostic standard, and should be used whenever practical. However, a negative culture in the

face of positive Gram stain does not rule out gonococcal infection. More cases of gonorrhoea are reported in males than female. It reflects greater ease of isolation of gonococcus. Cultivation of gonococci from male urethra rarely presents problems, because of scanty commensal flora and absence of competing bacteria. Male infection is usually symptomatic. Acute urethritis is the predominant manifestation compelling the patient to seek urgent medical attention<sup>13</sup>. The sensitivity of culture isolation in this study was 98.94%. Using Gram stain alone to diagnose gonorrhoea, 7/94 (7.45%) cases would have been missed.

The primary location of genital infection in females is endocervix. Concomitant urethral infection occurs in 70-90%<sup>14</sup>. Usually patients are asymptomatic, ignorant or discount the infection, and hence act as a reservoir of infection<sup>15</sup>. Gram stain of a carefully collected endocervical specimen may be helpful in the diagnosis of *Neisseria gonorrhoea* in females. It has a high predictive value in endocervical smears showing intracellular diplococci in the presence of other signs and symptoms of gonococcal infection. The performance of the test is not as good as in male and has lower predictive value in asymptomatic women. The sensitivity of microscopy in the present study was considerably low (53.06%) in females compared to males (92.65%). Twenty six cases (46.96%) would have been missed if reliance were made on Gram stained smear alone. Keeping in view the low sensitivity of Gram staining, it should not be used as a sole method to diagnose endocervical or extra genital infections. Culture confirmation is necessary to diagnose gonococcal infection at these sites. Other contributing factors to improve diagnostic yield include adequacy of the clinical specimen, quality and freshness of the culture medium.

## REFERENCES

1. Westrom L. Incidence, prevalence, and trends of acute pelvic inflammatory disease and its consequences in industrialized countries. *Am J Obstet Gynaecol* 1980; 138: 880.
2. Dellabetta GEW, III Hook. Gonococcal infections. *Infect Dis Clin North Am* 1987; 1: 25.
3. Holmes KK, Eschenbach DA, Knapp JS. Salpingitis: Overview of aetiology and epidemiology. *Am J Obstet Gynaecol*. 1980; 138: 893.
4. Room ES. Sexually transmitted disease; testing and treating. *Adolesc Med*. 1999; 10 (2): 231.
5. Kerle KK, Mascola JR, Miller TA. Disseminated gonococcal infection. *Am Fam Physician*. 1992; 45: 209.
6. Desenclos JC, Garrity D, Scraggs M, et al. Gonococcal infection of the newborn in Florida, 1984-198. *Sex Transm Dis* 1992; 19: 105.
7. Berger RE, Alexander ER, Harnisch JP, et al. Etiology, manifestation and therapy of acute epididymitis: Prospective study of 50 cases. *J Urol*. 1979; 121: 750.
8. Watson PG. Using a national guideline: an audit of the management of gonorrhoea in the New Castle upon Tyne. *Int J STD AIDS* 2000; 11 (1): 677.
9. Morello JM, Janda WM, Doern GV. Neisseria and Branhamella. In: Balows A, Hausler WJ, Hermann KL, et al. eds manual of Clinical Microbiology. 5th ed. Washington, DC: American Society for Microbiology, 1991; 258.
10. Ison GA. Laboratory methods in genitourinary; medicine. Methods of diagnosing gonorrhoea. *Genitourin Med* 1990; 66: 453.
11. Rothenberg RB, Simon R, Chipperfield E, et al. Efficacy of selected diagnostic tests for sexually transmitted disease. *JAMA* 1976; 235: 49.
12. Heckles JE. Molecular studies on the pathogenesis of gonorrhoea. *J Med Microbiol*. 1987; 18: 293.
13. Gohen Ms, Cannon JG, Jerse AE, et al. Human experimentation with Neisseria Gonorrhoea; Rationale, methods and implication for the biology of infection and vaccine development. *J Inf Dis* 1994; 169: 532.
14. Platt R, Rice PA, McCormick WM. Risk of acquiring gonorrhoea and prevalence of abnormal aneal findings among women recently exposed to gonorrhoea. *JAMA* 1983; 250: 3205.
15. McCormick WM, Stumacher RJ, Johnson K, et al. Clinical spectrum of gonococcal infection in women. *Lancet* 1977; 1: 1182.

---

### Address for Correspondence:

Dr Sartaj Naeem,  
 Department of Microbiology, City Hospital, NHS Trust,  
 Dudley Road, Birmingham, West Midlands, UK, B18, 7QH  
 Email: mnkhattak@hotmail.com