

Comparison of Amsel's criteria with low and high Nugent's scores for the diagnosis of bacterial vaginosis

Rajni Mala, Seema Sood, Arti Kapil, Somesh Gupta¹, Neeta Singh²

Departments of Microbiology, ¹Dermatology and Venereology and ²Obstetrics and Gynaecology, AIIMS, New Delhi, India

Address for correspondence:

Dr. Seema Sood, Department of Microbiology, AIIMS, New Delhi, India.

E-mail: seemalsood@rediffmail.com

Abstract

Background: Bacterial vaginosis (BV) is the most common cause of vaginal discharge (VD) in women of reproductive age group. It is marked by displacement of beneficial *Lactobacillus* sp. by polymicrobial flora. BV is becoming a major public health concern as it is associated with adverse birth outcomes and increased susceptibility to sexually transmitted infections (STIs). Diagnosis of BV is currently done using clinical criteria (Amsel's) and the microbiological criteria (Nugent's scoring), the latter being the gold standard. Many out patient settings lack in microscopy facility and also skilled microbiologists, so reliance is placed on findings of clinical examination. **Aims and Objectives:** The aim of the study was to correlate Amsel's criteria with low (7–8) versus high (9–10) positive Nugent's scores for better understanding on utility of clinical criteria. **Material and Methods:** Patients with self-reported symptoms of vaginal discharge, genital itching were included and their pelvic examination was performed. Two swab samples were collected from lateral wall of vagina and posterior fornix and tested for BV infection using both Amsel's criteria and Nugent's score. **Results:** Of the total 125 women, 29 (23.2%) were positive for BV by Amsel's criteria, whereas 34 (27.2%) were positive by Nugent's scoring. Amsel's criteria showed a sensitivity of 100% with high Nugent's scores and 81% with low scores, thereby implying very few cases of diseased individuals being missed. **Conclusion:** This study demonstrates the continued utility of the Clinical criteria in outpatient setting as a screening test.

Key words: Amsel's criteria, bacterial vaginosis, *Gardnerella vaginalis*, lactobacilli, Nugent's scoring

Introduction

Bacterial vaginosis (BV) is characterized by dysbiosis of vaginal microbiome where lactobacilli are displaced by predominantly polybacterial anaerobic species. These include *Gardnerella vaginalis*, *Atopobium vaginae*, *Prevotella* and *Porphyromonas* (previously classified as *Bacteroides*), *Mobiluncus* spp., *Sneathia* (*Leptotrichia*), and *Mycoplasma hominis* and the list is ever expanding.^[1,2] This clinical condition causes vaginal discharge, itching, and malodor in women of childbearing age.^[3] In various studies, the prevalence of BV has been found to range from 15% to 30% in non-pregnant women and up to 50% in pregnant women.^[4-6] BV is associated with serious reproductive consequences and acquisition and transmission of sexually transmitted infections.^[7-9] Due to its high prevalence and associated complications, detection of this entity in women is of utmost importance. The diagnosis of BV is made by Amsel's criteria and Nugent's scoring, the latter being the gold standard. If microscopy expertise is not available, reliance is placed on findings of clinical examination.

Amsel's criteria is preferred by many for its ease and lack of requirement of diagnostician's microscopic experience. However, there are concerns about the sensitivity of this method, with some studies reporting a sensitivity as low as 37%.^[10] The present study was undertaken to assess the sensitivity and specificity of Amsel's criteria with low and high positive Nugent's scores for better understanding on utility of clinical criteria as it is frequently used in outpatient setting.

Materials and Methods

Study setting

This prospective study was conducted from April, 2019, to February, 2020, at a tertiary care hospital in New Delhi. A total of 125 women in the age group of 18–50 years attending the gynecology and dermatology outpatient department were recruited for the study. Patients with

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Mala R, Sood S, Kapil A, Gupta S, Singh N. Comparison of Amsel's criteria with low and high Nugent's scores for the diagnosis of bacterial vaginosis. Indian J Sex Transm Dis 2022;43:56-8.

Submitted: 30-Jul-2021

Revised: 07-Jan-2022

Accepted: 08-Jan-2022

Published: 07-Jun-2022

Access this article online

Quick Response Code:



Website:

www.ijstd.org

DOI:

10.4103/ijstd.ijstd_67_21

self-reported symptoms of vaginal discharge, genital itching, or genital burning were included, whereas menstruating women and patient who were already taking antibiotics in the last 30 days were excluded from the study.

Pelvic examination was performed on each participant after obtaining written informed consent. After speculum examination, samples of vaginal discharge were collected from lateral wall of vagina and posterior fornix using two cotton swabs. These were tested for BV infection using both Amsel's criteria and Nugent's score. The patients who fulfilled three of the following criteria were considered positive for BV using Amsel's: homogenous vaginal discharge, vaginal pH ≥ 4.5 , presence of clue cells [Figure 1], and fishy odor after addition of 10% KOH (whiff test).^[11]

Microbiological diagnosis was done as per Nugent's score following Gram staining. Scores of 0–3 are graded as

normal vaginal flora that is *Lactobacillus* - predominate, 4–6 as intermediate flora, and 7–10 as BV flora with depletion/disappearance of *Lactobacillus* species, presence of numerous *G. vaginalis/Bacteroides*, and curved Gram-variable bacilli.^[12] The details of evaluating Gram stain for BV by Nugent's scoring (scoring of morphotypes) are shown in Table 1.

At least five oil immersion fields were examined to determine the average of each morphotype.

A score between 0–3 was interpreted as normal, 4–6 as intermediate, and 7–10 as BV.

The presence of curved Gram-variable anaerobic bacilli (*Mobiluncus* spp. or possibly BVAB1: BV associated bacteria) results in high Nugent's scores of 9–10. The scoring was done by two microbiologists in a blinded manner. For the purpose of the study, we divided BV patients into those with low scores (7–8) and those with high scores (9–10).

The statistical analysis for comparison of Amsel's criteria with Nugent's scoring was done using IBM (International Business Machines Corp., Armonk, New York, United States) SPSS software.

Results

Of the total 125 women, 29 (23.2%) were positive for BV by Amsel's criteria, whereas 34 (27.2%) were positive by Nugent's scoring. The percentages of complete agreement and complete disagreement in Nugent's scoring between the two observers were 96% and of 4%, respectively. The highest number of BV positive cases by gold standard (Nugent's scoring) fall in the 25–29 years of age group. Amsel's criteria were compared to the gold standard and the overall sensitivity, specificity, positive predictive value, and negative predictive value were found to be 85.29%, 95.60%, 87.87%, and 94.56%, respectively. A total of four false positive diagnosis (discordance: 4.2%) and five false negative (discordance: 12.8%) were showed by Amsel's criteria. All the false positive cases were presented as intermediate flora by Nugent's scoring. Whereas, all the false negative cases diagnosed by clinical criteria were having low positive (NS = 7–8) Nugent's score. When Amsel's criteria were separately compared with the low positive (NS = 7–8) and high positive (NS = 9–10) Nugent's score, the sensitivity was 80.77% and 100%, respectively [Table 2].

Conclusion

Amsel's criteria showed a sensitivity of 100% with high Nugent's scores and 81% with low scores, thereby implying very few cases of diseased individuals being missed. This

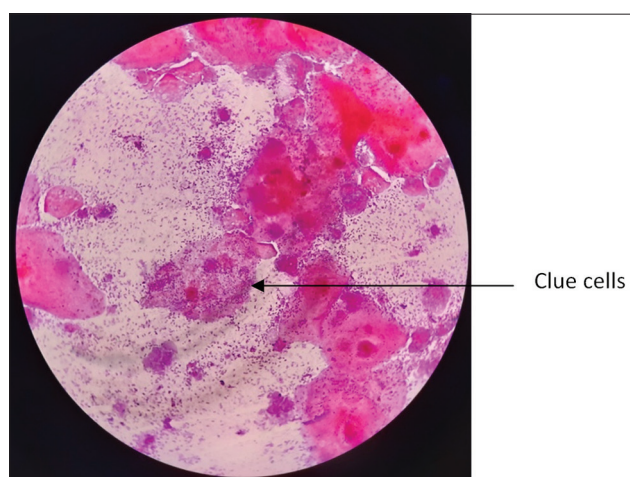


Figure 1: Clue cells (Gram stain: 1000 X)

Table 1: Nugent's scoring of Gram-stained smears

Score	<i>Lactobacillus</i> morphotypes/oil immersion field	<i>Gardnerella</i> Morphotypes/oil immersion field	<i>Mobiluncus</i> Morphotypes/oil immersion field
0	4+	0	0
1	3+	1+	1+/2+
2	2+	2+	3+/4+
3	1+	3+	-
4	0	4+	-

0=Per oil immersion field=0, <1=Per oil immersion field=1+, 1-4=Per oil immersion field=2+, 5-30=Per oil immersion field=3+, >30=Per oil immersion field=4+

Table 2: Comparison of Amsel's criteria with Nugent's scoring criteria (Gold standard)

Diagnostic methods Amsel's criteria	Nugent's criteria						
	Positive	Negative	Total	SN (%)	SP (%)	PPV (%)	NPV (%)
Positive	29	4	33	85.29	95.60	87.87	94.56
Negative	5	87	92				
Total	34	91					

Diagnostic methods Amsel's criteria	Nugent's criteria					
	Low positive (NS=7-8)	High positive (NS=9-10)	Negative	Total	SN (%) (against low positive)	SN (%) (against high positive)
Positive	21	8	4	33	80.77	100
Negative	5	0	87	92		
Total	26	8				

SN=Sensitivity, SP=Specificity, PPV=Positive predictive value, NPV=Negative predictive value

demonstrates the continued utility of the clinical criteria in outpatient setting as a screening test. Patients usually reach out to family physician or gynecologists for complaints related to changes in vaginal secretions. They can use Amsel's criteria to decisively treat and prevent the serious complications.

Acknowledgment

The authors would like to thank ICMR for providing fellowship.

Financial support and sponsorship

The authors are grateful to ICMR for providing Senior research fellowship (OMI-Fellowship/6/2019-ECD-I).

Conflicts of interest

There are no conflicts of interest.

References

1. Onderdonk AB, Delaney ML, Fichorova RN. The human microbiome during bacterial vaginosis. *Clin Microbiol Rev* 2016;29:223-38.
2. Amabebe E, Anumba DO. The vaginal microenvironment: The physiologic role of *Lactobacilli*. *Front Med (Lausanne)* 2018;5:181.
3. Yudin MH, Money DM. No. 211- Screening and management of bacterial vaginosis in pregnancy. *J Obstet Gynaecol Can* 2017;39:184-91.
4. Nelson DB, Macones G. Bacterial vaginosis in pregnancy: Current findings and future directions. *Epidemiol Rev* 2002;24:102-8.
5. Guise JM, Mahon SM, Aickin M, Helfand M, Peipert JF, Westhoff C. Screening for bacterial vaginosis in pregnancy. *Am J Prev Med* 2001;20:62-72.
6. Holzman C, Leventhal JM, Qiu H, Jones NM, Wang J, BV Study Group. Factors linked to bacterial vaginosis in nonpregnant women. *Am J Public Health* 2001;91:1664-70.
7. Allsworth JE, Peipert JF. Severity of bacterial vaginosis and the risk of sexually transmitted infection. *Am J Obstet Gynecol* 2011;205:113.e1-6.
8. Mirmonsef P, Krass L, Landay A, Spear GT. The role of bacterial vaginosis and trichomonas in HIV transmission across the female genital tract. *Curr HIV Res* 2012;10:202-10.
9. Eschenbach DA. Bacterial vaginosis and anaerobes in obstetric-gynecologic infection. *Clin Infect Dis* 1993;16 Suppl 4:S282-7.
10. Sha BE, Chen HY, Wang QJ, Zariffard MR, Cohen MH, Spear GT. Utility of Amsel criteria, Nugent score, and quantitative PCR for *Gardnerella vaginalis*, *Mycoplasma hominis*, and *Lactobacillus* spp. for diagnosis of bacterial vaginosis in human immunodeficiency virus-infected women. *J Clin Microbiol* 2005;43:4607-12.
11. Amsel R, Totten PA, Spiegel CA, Chen KC, Eschenbach D, Holmes KK. Nonspecific vaginitis. Diagnostic criteria and microbial and epidemiologic associations. *Am J Med* 1983;74:14-22.
12. Nugent RP, Krohn MA, Hillier SL. Reliability of diagnosing bacterial vaginosis is improved by a standardized method of gram stain interpretation. *J Clin Microbiol* 1991;29:297-301.

IASSTD & AIDS

Sardarilal Memorial Award

For the best original article published in IJSTD & AIDS

2019:

Recipient: Nisha Madaan

Co-Authors: Deepika Pandhi, Vineeta Sharma, Sambit Nath Bhattacharya, Kiran Guleria, Kiran Mishra, Mausumi Bharadwaj

Association of abnormal cervical cytology with coinfection of human papillomavirus and Chlamydia trachomatis [Issue : 2019 Jan-Jun; 40(1): 57-63]

2020

Recipient: PK Ashwini

Co-Authors: Jayadev Betkerur, Veeranna Shastry

Study of mucocutaneous manifestations of HIV and its relation to total lymphocyte count [Issue: 2020 Jan-Jun; 41(1): 47-52]

Submit an original article and be a potential winner for
Sardarilal Memorial Award