

Gardnerella vaginalis presence in vaginal dysbiosis: A secondary analysis



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Background

It has been hypothesized that *Gardnerella vaginalis* (GV) is necessary for the development of bacterial vaginosis (BV), and BV is associated with an increase of GV abundance which in turn has been related to biofilm formation. We conducted a secondary analysis using data from multiple studies to investigate the first part of this hypothesis.

Results

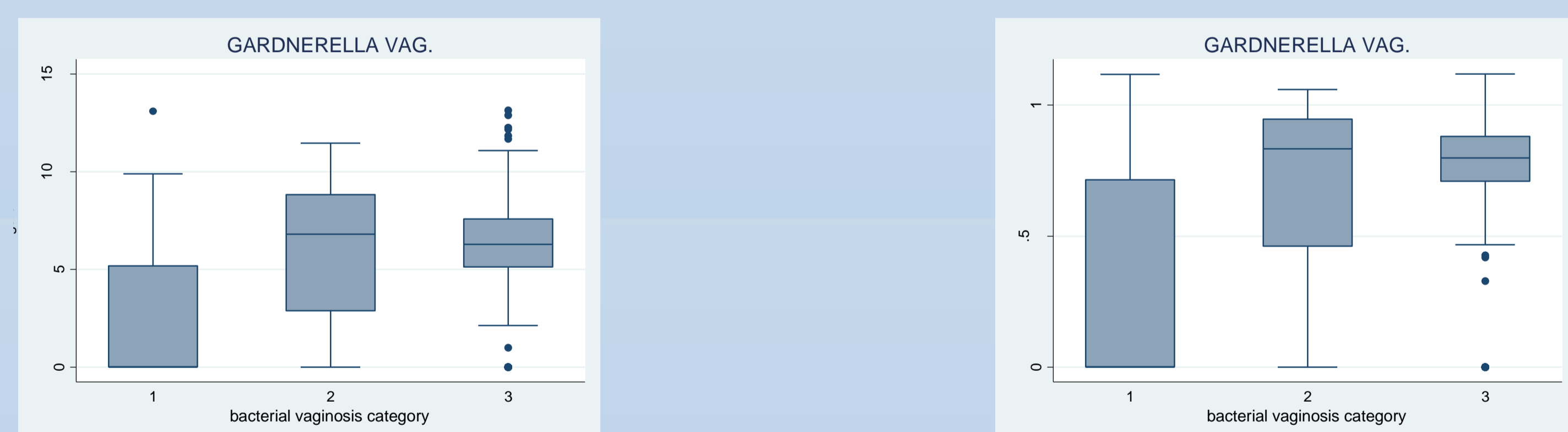
Using Nugent scores, 1054 (67%), 125 (8%), and 398 (25%) samples had normal, intermediate and BV microbiota, respectively.

Gardnerella vaginalis

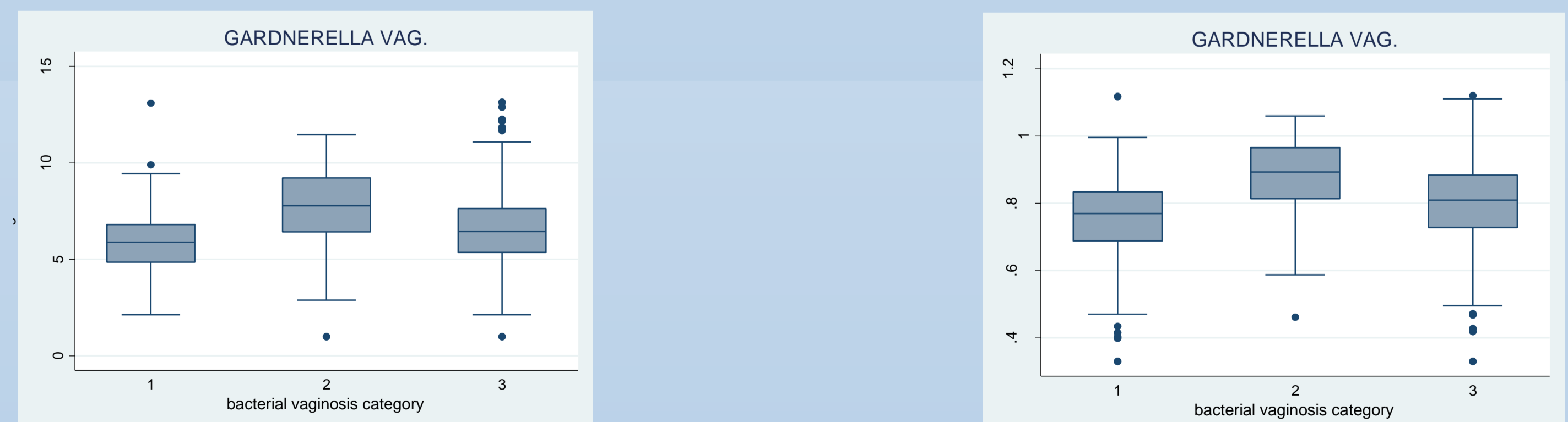
BV was associated with GV presence in all countries (χ^2 : $p < 0.001$). The median GV counts were higher for samples with intermediate-score (Kruskal-Wallis: $p < 0.001$) and BV-score ($p = 0.001$) compared to samples with normal-score, with no difference between samples with intermediate-score and BV-score ($p = 0.459$). Only 25(6%) of the 398 samples with BV-score were negative for GV by PCR compared to 30(24%) with intermediate-score, and 663(63%) with normal-score.

| | Tanzania | | South Africa | |
|-------------|------------|------------|--------------|------------|
| | GV absent | GV present | GV absent | GV present |
| Belgium | | | | |
| Nugent 0-3 | 17(20.7%) | 65(79.3%) | 200(70.7%) | 83(29.3%) |
| Nugent 4-6 | 1(2.5%) | 39(97.5%) | 7(29.2%) | 17(70.8%) |
| Nugent 7-10 | 0 | 85(100%) | 6(4.5%) | 126(95.5%) |
| | Kenya | | Rwanda | |
| Nugent 0-3 | 174(68.8%) | 79(31.2%) | 25(56.8%) | 19(43.2%) |
| Nugent 4-6 | 4(25%) | 12(75%) | 1(20%) | 4(80%) |
| Nugent 7-10 | 8(8%) | 92(92%) | 3(6.4%) | 44(93.6%) |
| | Belgium | | | |
| Nugent 0-3 | 247(63%) | 145(37%) | | |
| Nugent 4-6 | 17(42.5%) | 23(57.5%) | | |
| Nugent 7-10 | 247(63%) | 145(37%) | | |

Gardnerella counts by BV category including 0 values



Gardnerella counts by BV category excluding 0 values



Methods

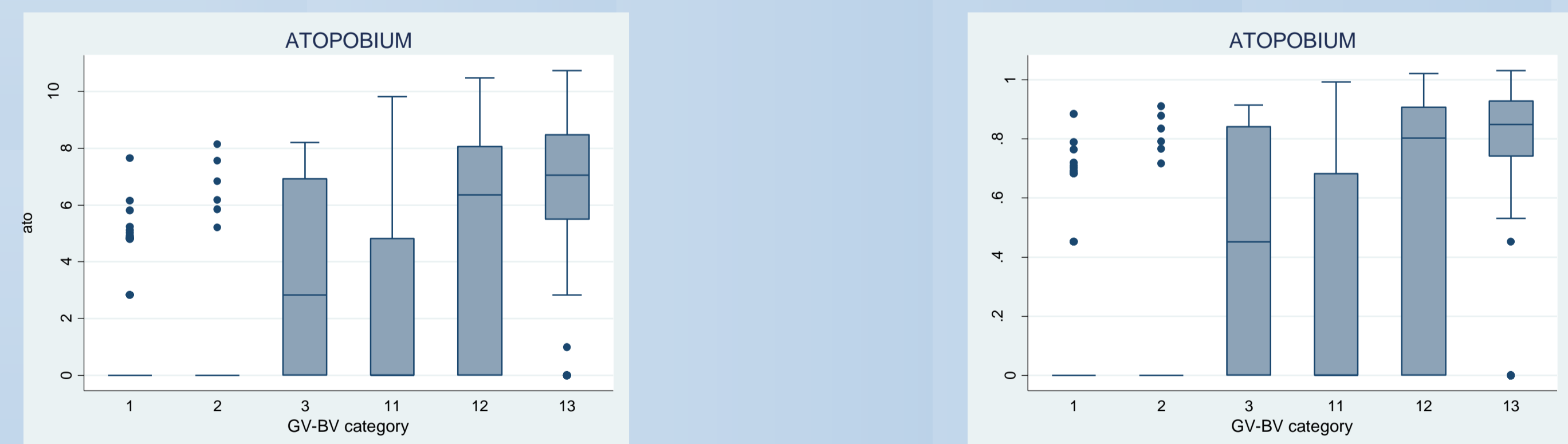
Gram-stained Nugent scores and log-transformed bacterial counts obtained by in-house quantitative PCR for selected *Lactobacillus* species, GV and *Atopobium vaginae* (AV) counts were available for 1577 samples of women from Belgium (n=469), Tanzania (n=207), South Africa (n=439), Kenya (n=369), and Rwanda (n=96). We determined the presence and median bacteria counts by Nugent score category using univariate analysis stratified by country.

Atopobium vaginae

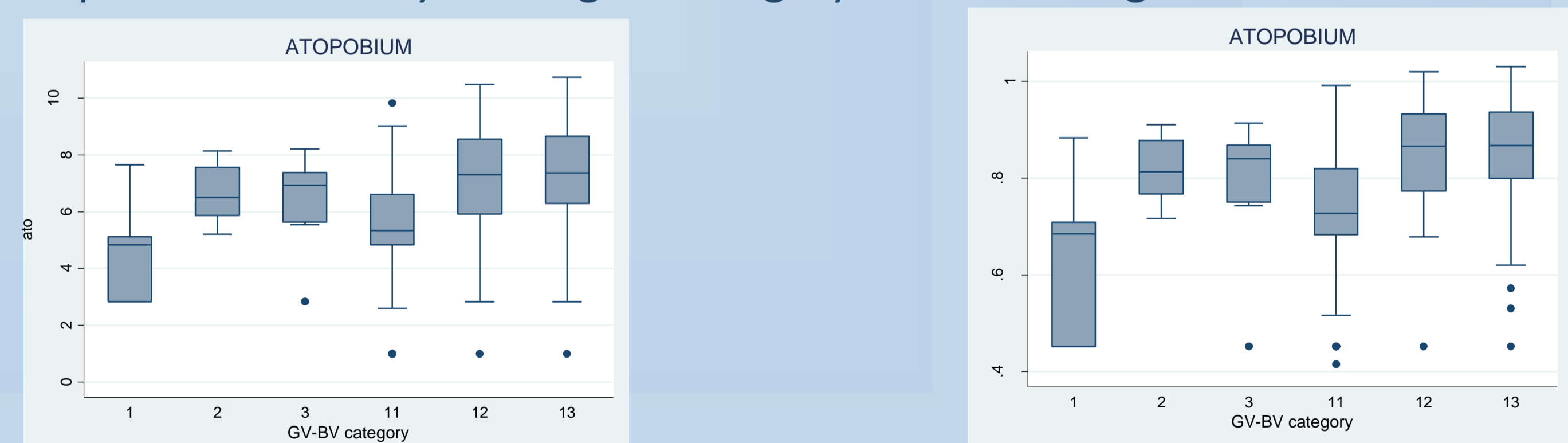
AV was detected in 13 (52%) of the 25 samples with BV and no presence of GV. The AV presence and counts in the 25 samples were lower compared to BV-positive-GV-positive samples (88%) (χ^2 : $p < 0.001$;Kruskal-Wallis: $p < 0.001$) whereas AV presence and counts were higher compared to BV-negative samples (20%) (χ^2 : $p < 0.001$;Kruskal-Wallis: $p < 0.001$).

| | | Atopobium absent | Atopobium present |
|------------|-------------|------------------|-------------------|
| GV absent | Nugent 0-3 | 645(97.3%) | 18(2.7%) |
| | Nugent 4-6 | 24(80%) | 6(20%) |
| | Nugent 7-10 | 12(48%) | 13(52%) |
| GV present | Nugent 0-3 | 254(65%) | 137(35%) |
| | Nugent 4-6 | 26(27.4%) | 69(72.6%) |
| | Nugent 7-10 | 46(12.3%) | 327(87.7%) |

Atopobium counts by GV-Nugent category and including 0 values



Atopobium counts by GV-Nugent category and excluding 0 values



GV-BV category: 1 GV- Nugent 0-3; 2 GV- Nugent 4-6; 3 GV- Nugent 7-10, 11 GV+ Nugent 0-3; 12 GV+ Nugent 4-6; 13 GV+ Nugent 7-10

Conclusions

We confirm that GV presence and higher GV loads are strongly correlated with BV by Nugent score. Half of the samples of women with GV-negative dysbiosis had AV present. Future research is needed to investigate the role of GV and/or AV-associated biofilm in BV and to evaluate the role of threshold of GV and AV for potential PCR based diagnostic testing for BV.



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