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.

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 using univariate analysis stratified by country.

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 (Chi²: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 662(63%) with normal-score.

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<th>Country</th>
<th>Bulgaria</th>
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<th>Italy</th>
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<tbody>
<tr>
<td>GV present</td>
<td>160</td>
<td>125</td>
<td>1054</td>
<td>398</td>
<td>25(6%)</td>
<td>207</td>
<td>439</td>
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<tr>
<td>GV absent</td>
<td>1054</td>
<td>398</td>
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GV-BV category
ATOPOBIUM

Gardnerella vaginalis counts by BV category including 0 values

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%) (Chi²:p=0.001;Kruskal-Wallis:p<0.001) whereas AV presence and counts were higher compared to BV-negative samples (20%) (Chi²:p=0.001;Kruskal-Wallis:p<0.001).

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AV-BV category
ATOPOBIUM

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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