Validation of bleach-treated smears for the diagnosis of Pulmonary Tuberculosis

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Objective

To determine the performance of bleach treated smears followed by short-term digestion, overnight sedimentation and centrifugation compared to direct smears using culture as gold standard
Methods (1)

- Consecutive TB suspects visiting health centres in Awassa, southern Ethiopia, submitted spot, morning and spot sputum samples.

- The samples were pooled and direct smears were examined after ZN staining and aliquots cultured onto Löwenstein-Jensen media.
Methods (2)

The remaining samples were treated with household bleach and divided into three aliquots for:

- Short-term digestion (30 minutes)
- Centrifugation at 3000 g
- Overnight sedimentation

All smears were stained by ZN and examined under light microscope
Results (1)

• Of 497 pooled samples, Acid-fast bacilli were detected in

- 126 (25%) pooled samples by direct smear
- 141 (28%) after short-term digestion,
- 169 (34%) after overnight sedimentation
- 198 (40%) after centrifugation (P< 0.001).
# Results (2)

<table>
<thead>
<tr>
<th>Sputum processing technique</th>
<th>Sensitivity % (95% CI)</th>
<th>Specificity % (95% CI)</th>
<th>PPV % (95% CI)</th>
<th>NPV % (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct smear</td>
<td>51.1 (44.6–57.5)</td>
<td>96.9 (94.4–98.6)</td>
<td>93.7 (88.3–97.0)</td>
<td>70.0 (64.7–74.1)</td>
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<tr>
<td>Short-term digestion</td>
<td>53.2 (46.8–59.6)</td>
<td>93.6 (89.7–95.8)</td>
<td>87.2 (80.9–90.2)</td>
<td>70.0 (64.7–74.3)</td>
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<tr>
<td>Overnight sedimentation</td>
<td>57.6 (51.1–63.8)</td>
<td>86.5 (82.0–90.2)</td>
<td>78.7 (72.0–84.4)</td>
<td>70.1 (65.0–74.9)</td>
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<tr>
<td>Centrifugation</td>
<td>63.6 (57.3–69.7)</td>
<td>80.8 (75.8–85.2)</td>
<td>74.2 (67.8–80.0)</td>
<td>71.9 (66.6–76.8)</td>
</tr>
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</table>
Discussion & Conclusions

• Bleach treatment of sputum and centrifugation significantly improves the sensitivity of smear microscopy for the diagnosis of TB in a high TB burden area
Future perspectives

- Evaluation of the operational advantages of the improved yield of bleach techniques under operational and programme conditions

- Standardization of the techniques for better comparison across different settings