IMPACT OF ALCOHOL CONSUMPTION ON TUBERCULOSIS TREATMENT OUTCOMES

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BACKGROUND

TB IS THE TOP INFECTIOUS KILLER IN THE WORLD

10.6 million people fell ill with TB in 2021

IN 2021
1.6 MILLION PEOPLE DIED FROM TB

YES YOU AND I CAN END TB
24 MARCH

THE CLOCK IS TICKING
PREVALENCE OF TB IN WORCESTER

Number of Tuberculosis (TB) Cases in the Western Cape

- Total: 12,579
- 13.9% Positive: 2,329
- Last Month: 195
- TB Deaths: 198

No. of TB Cases by Subdistrict:

- Mitchell's Pass: 3,971
- Kharekga: 1,911
- Southern: 2,702
- Klapmuts: 2,955
- Drakenstein: 2,372
- George: 2,350
- Breed Valley: 2,232
- Northern: 1,803
- Langeberg: 1,505
- Theewaterskloof: 1,238
- Witsand: 1,315
- Sellenbosch: 1,150
- Swartland: 1,014
- Matzikama: 1,000
- Oudtshoorn: 989
- Saldanha Bay: 917
- Molteno Bay: 866
- Knysna: 718
- Cederberg: 697
- Overstrand: 676

No. of TB Cases by Subdistrict

Map of Worcester area with TB case counts.
BACKGROUND

- Ten percent of tuberculosis (TB) deaths are attributable to problem alcohol use globally
- Problem alcohol use in key populations is a major driver of poor TB treatment response
- Heavy episodic drinking, is associated with delayed culture conversion and higher rates of treatment failure, relapse and death
- High prevalence of alcohol and other drug use in the WC, especially in the rural farming regions
AIMS

AIM 1
To (i) examine the associations between problem alcohol use and TB treatment outcomes, and (ii) demonstrate that these associations persist independent of adherence to TB treatment

AIM 2
To evaluate the effect of problem alcohol use on the PK/PD of TB drugs among participants not living with HIV
METHOD

Baseline
- Biobehavioral interview
- Blood collection
- Chest X-Ray
- Sputum for MTB isolate
- Data extraction from medical records

Week 1-12
- Sputum collection
- Week 2
  - Pax gene blood draw

Post treatment (12 months after treatment completion)
- TB symptom screening
- Extra sputum if experiencing symptoms
- Time-line follow back

Months 1-6 Visits
- Interviews
- Side effects screening
- Data extraction from medical record
- Time-line follow back

Baseline

Week 1-12

Post treatment

Months 1-6 Visits
INNOVATIONS: CAPTURING ALCOHOL CONSUMPTION

**Self-report**
- Alcohol Use Disorders Identification Test (AUDIT), Time-Line Follow Back (TLFB)

**Biomarker**
- Blood, Phosphatidylethanol (PEth) test

**Repeated Measures**
- (changes over time)

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**Quantities of different drinks that are the same as ONE standard drink**

- 1 glass wine (125ml)
- 1 single measure spirits (25ml)
- 1 bottle beer/cider (330ml)
- 1 can beer/cider (330ml)
- 1 carton ijuba (1L)
- R2-00 jar isicatho/injimane
## Classification of Alcohol Exposure

### Peth (ng/mL)

<table>
<thead>
<tr>
<th>Level</th>
<th>Peth (ng/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>&lt; 50</td>
</tr>
<tr>
<td>Moderate</td>
<td>50-200</td>
</tr>
<tr>
<td>High</td>
<td>&gt; 200</td>
</tr>
</tbody>
</table>

### AUDIT Risk

- **Low risk**: scores < 8
- **Harmful to hazardous**: scores of 8–20
- **Dependence**: scores ≥ 8

### Heavy Alcohol Use (TLFB)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Emergency consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>≥96 g AA (8 standard drinks)</td>
</tr>
<tr>
<td>Women</td>
<td>≥72 g AA (six standard drinks)</td>
</tr>
</tbody>
</table>
## BASELINE DEMOGRAPHICS \((N=392)\)

<table>
<thead>
<tr>
<th>No. (%) or Median (Q1,Q3)</th>
<th>Problem Alcohol Use ((N=221))</th>
<th>No Problem Alcohol Use ((N=171))</th>
<th>(p) value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Male at Birth</strong></td>
<td>133 (60.2%)</td>
<td>103 (60.2%)</td>
<td>0.992</td>
</tr>
<tr>
<td><strong>Age, years</strong></td>
<td>40 (31, 49)</td>
<td>35 (25, 48)</td>
<td><strong>0.020</strong></td>
</tr>
<tr>
<td><strong>BMI</strong></td>
<td></td>
<td></td>
<td>0.938</td>
</tr>
<tr>
<td>Underweight (&lt;18.5)</td>
<td>137 (62.0%)</td>
<td>109 (63.7%)</td>
<td></td>
</tr>
<tr>
<td>Normal weight (18.5-25)</td>
<td>73 (33.0%)</td>
<td>54 (31.6%)</td>
<td></td>
</tr>
<tr>
<td>Overweight &amp; obese (&gt;25)</td>
<td>11 (5.0%)</td>
<td>8 (4.7%)</td>
<td></td>
</tr>
<tr>
<td><strong>Race, self identified</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cape Coloured (Mixed Ancestry)</td>
<td>210 (95.0%)</td>
<td>157 (91.8%)</td>
<td></td>
</tr>
<tr>
<td>Black African</td>
<td>9 (4.1%)</td>
<td>9 (5.3%)</td>
<td></td>
</tr>
<tr>
<td>Indian/Asian</td>
<td>0 (0.0%)</td>
<td>1 (0.6%)</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>0 (0.0%)</td>
<td>1 (0.6%)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>2 (0.9%)</td>
<td>3 (1.8%)</td>
<td></td>
</tr>
<tr>
<td><strong>Education &lt; 9th Grade</strong></td>
<td>104 (47.1%)</td>
<td>62 (36.3%)</td>
<td><strong>0.032</strong></td>
</tr>
<tr>
<td><strong>Unemployed</strong></td>
<td>145 (65.6%)</td>
<td>119 (69.6%)</td>
<td>0.405</td>
</tr>
<tr>
<td><strong>Previous incarceration</strong></td>
<td>67 (30.3%)</td>
<td>57 (33.5%)</td>
<td>0.499</td>
</tr>
<tr>
<td><strong>Depression Risk</strong></td>
<td></td>
<td></td>
<td>0.633</td>
</tr>
<tr>
<td>High depression risk</td>
<td>146 (66.1%)</td>
<td>109 (63.7%)</td>
<td></td>
</tr>
<tr>
<td>Low depression risk</td>
<td>75 (33.9%)</td>
<td>62 (36.3%)</td>
<td></td>
</tr>
<tr>
<td><strong>Household Hunger</strong></td>
<td></td>
<td></td>
<td>0.408</td>
</tr>
<tr>
<td>Moderate to severe</td>
<td>101 (45.7%)</td>
<td>71 (41.5%)</td>
<td></td>
</tr>
<tr>
<td>Little to none</td>
<td>120 (54.3%)</td>
<td>100 (58.5%)</td>
<td></td>
</tr>
</tbody>
</table>
TREATMENT OUTCOMES
DRUG USE AT BASELINE

<table>
<thead>
<tr>
<th>Drug</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dagga</td>
<td>177 (45.15)</td>
</tr>
<tr>
<td>Tik</td>
<td>117 (29.85)</td>
</tr>
<tr>
<td>Cocaine</td>
<td>8 (2.04)</td>
</tr>
<tr>
<td>Heroin</td>
<td>5 (1.28)</td>
</tr>
<tr>
<td>Mandrax</td>
<td>132 (33.67)</td>
</tr>
<tr>
<td>Inhalants</td>
<td>34 (8.67)</td>
</tr>
<tr>
<td>Ecstasy/Club drugs</td>
<td>14 (3.57)</td>
</tr>
<tr>
<td>Prescription drugs</td>
<td>8 (2.04)</td>
</tr>
</tbody>
</table>
PEOPLE WHO SMOKE DRUGS (55% OF COHORT), TB DISEASE BURDEN AND INFECTIOUSNESS IN CLINIC SETTING

**Association Between Smoked Substance Use and Baseline Time to Positivity** (N=239)

<table>
<thead>
<tr>
<th></th>
<th>Adjusted Hazard Ratio</th>
<th>95% CI</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoked drug use</td>
<td>1.48</td>
<td>(1.10, 1.97)</td>
<td>0.008</td>
</tr>
</tbody>
</table>

*Adjusted for age, gender, HIV, tobacco
*Reference group: no smoked substance use

**Association Between Smoked Substance Use and Cavitation**, (N=293)

<table>
<thead>
<tr>
<th></th>
<th>Adjusted Odds Ratio</th>
<th>95% CI</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoked substance use</td>
<td>1.08</td>
<td>(0.62, 1.87)</td>
<td>0.799</td>
</tr>
</tbody>
</table>

*Adjusted for age, gender, HIV, tobacco, and previous TB
*Reference group: no smoked substance use, no previous TB

Myers B, et al, *IJTL*, *in press*

**Association Between Smoked Substance Use and Smear Positivity** (N=302)

<table>
<thead>
<tr>
<th></th>
<th>Adjusted Odds Ratio</th>
<th>95% CI</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoked substance use</td>
<td>2.28</td>
<td>(1.22, 4.34)</td>
<td>0.011</td>
</tr>
</tbody>
</table>

*Adjusted for age, gender, HIV, tobacco
*Reference group: no smoked subst

**Diagram:**

- Cannabis
- Methamphetamine
- Mandrax

SALT/ observing evidence

[Image of Bronwyn Myers]
DEPRESSION RISK TRAJECTORIES BY ALCOHOL USE
QUALITATIVE STUDY AIM

• To explore participants’ and key stakeholders’ perceptions of the relationship between alcohol use and TB disease
• To identify the reasons for changes in alcohol consumption during illness and throughout treatment and
• To explore readiness of participants who consume alcohol to partake in reduction or cessation programs during TB treatment
PERCEPTIONS OF ALCOHOL USE & TB

Perceived increased transmission of TB among those who use alcohol
“It is something that you pick up while using alcohol—drinking out of one glass. The guys coughs right in your face” - Male participant

Awareness of the effect of alcohol on TB related outcome
“Many people take their medication and go and drink or smoke and that has an effect on them. They get dizzy, get attacks shake etc.” - Male participant

Alcohol associated with decreased medication adherence
“After 2-3 months of treatment then they feel fine. That’s when they start drinking again. They feel fine but the TB is still inside their system.” (Male Participant, FG1)
CONCLUSION

• Patients with an alcohol use disorder have a higher incidence of adverse reactions
• Higher than expected prevalence of TB disease among people who smoke illicit drugs in a high TB burden setting
• Depression risk associated with alcohol dependence
• Drivers of problem alcohol use were poverty, violence and the normalization of heavy episodic drinking.