



Sleep in rural and urban settings in South Africa: correlates and impact of HIV status

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Relationship between sleep disruption and hypertension: epidemiological studies

- USA: Knutson et al, 2009:
 - 578 African Americans and whites, 33–45 years
 - reduced sleep duration /sleep maintenance at baseline: predictor of higher blood pressure levels over 5 years at baseline [OR=1.37 (1.05-1.78)]
- China: Kim et al, 2018
 - 106,385 participants (no hypertension/CVD): repeated measures of sleep duration over 2.4 years.
 - $\searrow \geq 2$ hours of sleep and $\nearrow \geq 2$ hours of sleep compared with no change in sleep duration: higher risk of incident hypertension in women [HR: 1.46 (1.08-1.98)] and men [HR: 1.31 (1.10-1.56)].
 - Women with persistently shorter sleep durations compared with those who maintained 7 hours of sleep: greater risk of developing hypertension during the subsequent follow-up period.

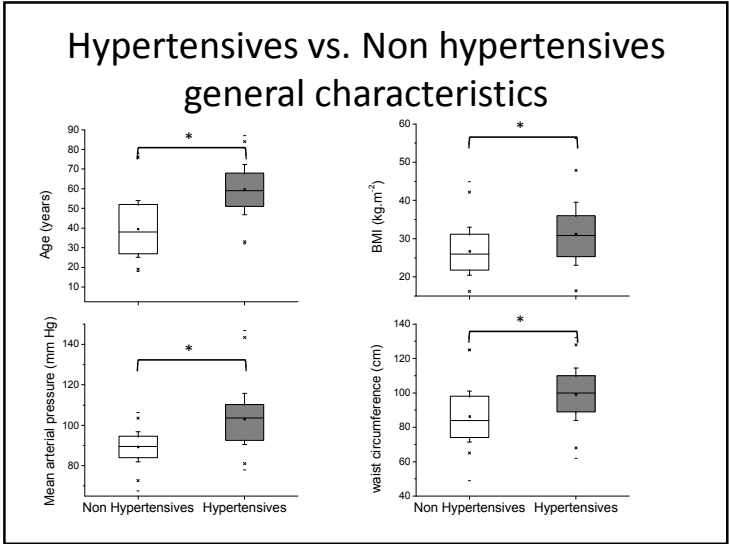
- South Africa:
 - 40% hypertensives
 - 12% HIV positive, 60% treated.
 - 2nd cause of mortality: diabetes
- Sleep and circadian disorders associated with cardiometabolic risk
- Detection and treatment of sleep disorders: not done in public healthcare

Epidemiological studies

- South Africa: Pretorius et al, 2015
 - 862 women (41 ± 16 years and BMI 29.9 ± 9.2)
 - Longer night time sleep duration \rightarrow higher diastolic ($\beta = 0.005, p < 0.01$) and systolic BP ($\beta = 0.003, p < 0.05$)
 - 449 men (38 ± 14 years and BMI 24.8 ± 8.3).
 - napping for >30 minutes/day: lower SBP and DBP

Sleep, circadian rhythms and non communicable diseases

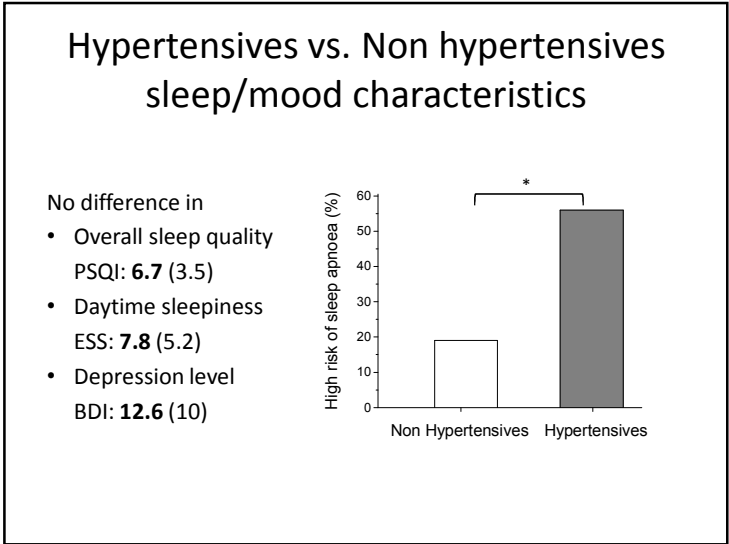
- physiological underpinnings:
 - Increased sympathetic activity in general sleep disruption → hypertension
 - Specifically sleep apnoea → oxidative stress → endothelial dysfunction → hypertension



Relationship between risk of sleep apnoea and hypertension in urban South Africa

- 204 included in the analysis
- 101 Non hypertensives:
 - Females: 82%
- 103 hypertensives
 - Treated: 46
 - Resistant: 32
 - Untreated: 25

} **HYPERTENSIVES**
- Females: 86% (NS)



Multivariate analysis

- Does High Risk Sleep apnoea on the Berlin Questionnaire remain a significant predictor of being hypertensive when adjusting for other important covariates? (BMI, age, waist circumference) – logistic regression
- **YES:**
- Adjusted Wald OR [95% CI]: **3.3 [1.4 -7.6]**

Associated factors

- Treatment with Efavirenz - but not in recent studies
- Peripheral neuropathy/ Pain
- Mitigated association with CD4 counts/ Viral loads.
- Depression
- Lower socioeconomic status
- Fatigue/ daytime sleepiness

HIV and sleep?

- Before treatment:
 - More SWS in last part of the night
 - Multiple awakenings
- During treatment:
 - Overall report of ~40-60% of HIV cohorts report sleep disturbances
 - Higher sleep apnoea than expected for equivalent weight/age in non HIV+ population

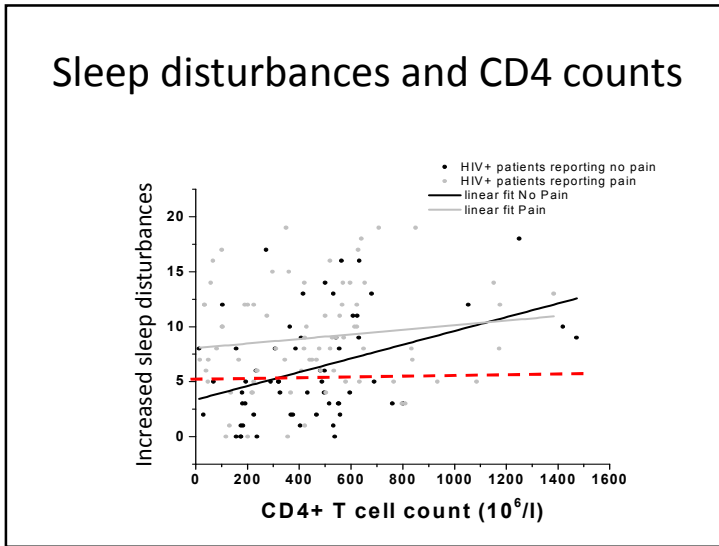
HIV and sleep: Study in urban clinic

Cross sectional study run in Soweto in 2012 (Redman et al, 2018):

- 139 patients of African ancestry
- ~ 43 years old
- 70% female
- Baseline CD4: 89
- Time since diagnosis ~ 7 years
- Time on treatment ~4 years
- 60% with PSQI>5
- 41% with BDI>17 (clinical depression)
- 55% reported pain at the time of the visit



- Higher PSQI associated with depression, pain and increased CD4 counts, but not with type of ARV treatment (EFV, D4T, TDF, PI tested)



Risk of sleep apnoea, cardiovascular risk and HIV

- Is scoring high risk of sleep apnoea associated with higher blood pressure in South Africa?
- Are treated HIV positive patients at increased risk of developing hypertension compared to matched HIV negative controls?


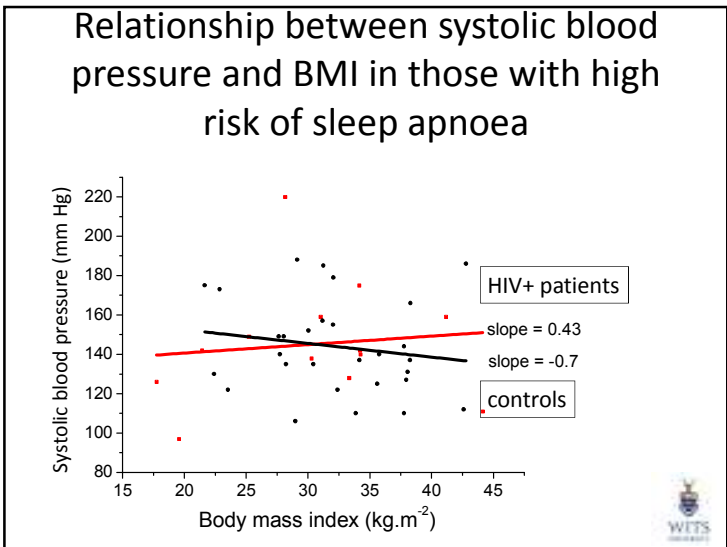
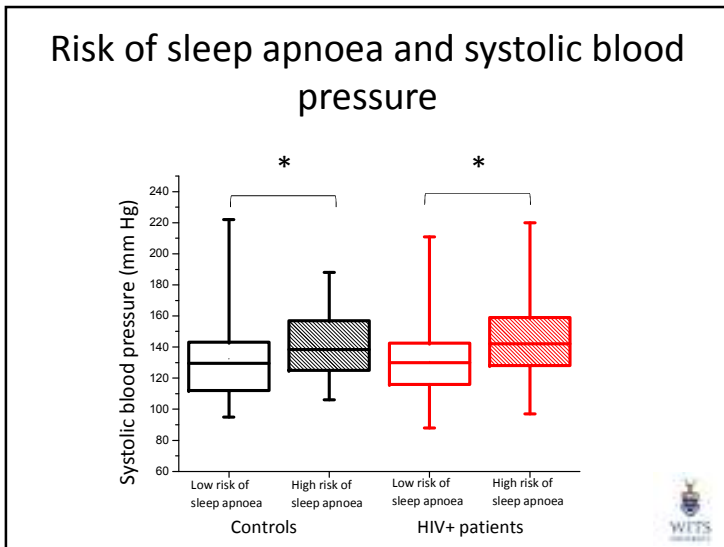
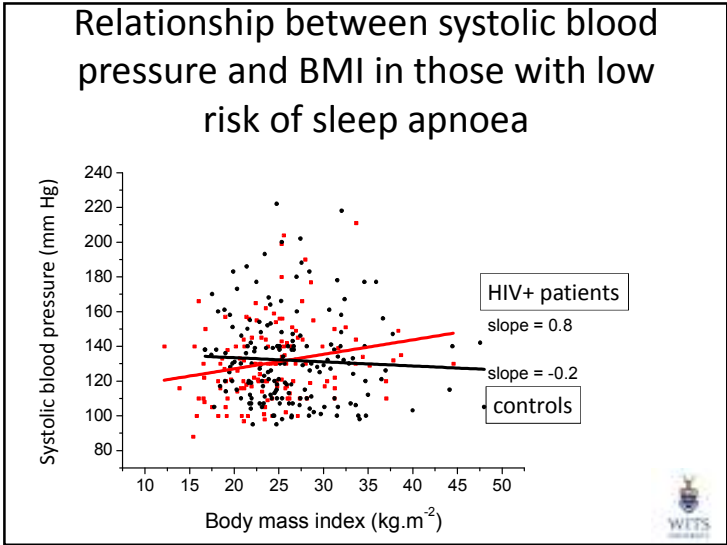
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	HIV + patients N=147	Controls N=200
Age, mean (SD)		
Women, %		
Employed, %		
Education, %		
Grade 6 or less		
Finished grade 7		
Finished grade 12		

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	HIV + patients	Controls
SBP (mm Hg)		
DBP (mm Hg)		
Hypertensive (%)		
BMI (kg.m ⁻²)		
High Risk of Sleep Apnoea (%)		
CD4 counts / μ L		

* p value <0.05 for the comparison between HIV+ patients and controls

Summary

- 37% hypertensive
- higher systolic blood pressure associated with high risk of sleep apnoea
- HIV+ patients : same percentage at high risk of sleep apnoea as controls
- But BMI was significantly lower → HIV+ patients may be at higher risk of developing sleep apnoea than controls
- HIV+ patients : increased risk of developing hypertension compared to matched HIV- controls as their BMI increases

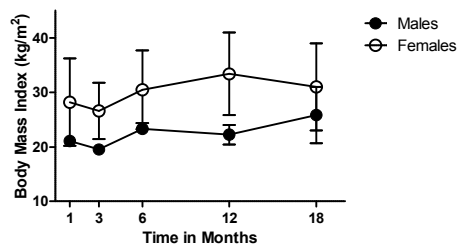


What next?

- Larger longitudinal cohort study: 856 HIV vs 1200 HIV- controls: Ndlovu Cohort study (Vos et al, 2017)
- More measurements of cardiovascular risk and metabolic risk
- Circadian measurements
- Immune measurements



BMI over time in 23 HIV+ patients starting treatment



Risk of sleep apnoea increased with higher BMI
 And decreased with increased CD4 counts
 (+100 CD4 associated with OR=0.52[0.28-0.98])
 Increased BMI and older age associated with higher MAP

