

Abstract

Background: Adherence to antiretroviral (ARV) therapy is essential for Prevention of Mother to Child Transmission (PMTCT). In South Africa (SA), PMTCT first line antiretroviral (ARV) regimens are TDF + 3TC (or FTC) + EFV. While self-report is widely used to assess adherence to ARVs, it may be over-reported. This study compared two self-report adherence scales with detection of ARV in dried blood spots (DBS) among HIV infected (HIV+) pregnant women in SA.

Methods: N = 392 HIV+ pregnant women receiving ARVs completed two self-reported adherence measures [Visual Analog Scale (VAS), AIDS Clinical Trials Group Adherence] and underwent a blood collection for DBS ARV testing at week 32 of pregnancy. Self-report adherence was coded as adherent if no missed doses were reported. DBS adherence was defined as 3 drugs detected (TDF + 3TC + EFV) or TDF + EFV detected. An area under the receiver operating characteristic curve (AUROC) analysis was estimated to examine the performance of the VAS and the ACTG scales in identifying participants as adherent, using DBS as the gold standard. Kappa statistics (κ), accuracy, sensitivity, specificity, positive predictive values (PPV) and negative predictive values (NPV) were calculated.

Results: DBS ARV detection was as follows: adherent = 74% ; Non-adherent = 26%. The proportion of participants identified as adherent by self-report were 86% (VAS) and 80% (ACTG). VAS relative to DBS: AUROC = 0.543 (VAS performed poorly in predicting adherence by DBS); κ = 0.101, (slight intermeasure agreement between the VAS and the DBS); accuracy = 0.719 [95% CI 0.67, 0.76]; sensitivity = 0.907 [95% CI 0.87, 0.94]; specificity = 0.178 [95% CI 0.11, 0.27]; PPV = 0.761 [95% CI 0.71, 0.80], and NPV = 0.400 [95% CI 0.26, 0.56]. ACTG relative to DBS: AUROC = 0.538, (ACTG performed poorly in predicting adherence by DBS); κ = 0.081 (poor intermeasure agreement between the ACTG and the DBS); accuracy = 0.673 [95% CI 0.63, 0.72]; sensitivity = 0.818 [95% CI 0.77, 0.86]; specificity = 0.257 [95% CI 0.18, 0.35]; PPV = 0.760 [95% CI 0.71, 0.81]; and NPV 0.329 [95% CI 0.23, 0.44].

Conclusion: Programs to strengthen ARV adherence among HIV+ pregnant women in rural SA are needed. Detectable levels of ARV were suboptimal in this population, indicating high risk of perinatal HIV infection and ARV resistance. Validation of self-reported ARV adherence among pregnant HIV+ women in SA are warranted to support PMTCT goals.

Introduction

- Adherence to antiretroviral (ARV) therapy is essential to prevent Mother to Child Transmission (PMTCT) of HIV
- First-line ARV regimens for PMTCT in South Africa are TENOFOVIR + LAMIVUDINE / EMTRICITABINE + EFAVIRENZ (TDF) + (3TC) / (FTC) + (EFV)
- Self report adherence tools are subject to social desirability bias adherence to PMTCT among pregnant women is suboptimal.
- Dried blood spots (DBS) are biological markers of adherence and measure the presence of ARV in the blood.
- DBS have not previously evaluated in PMTCT programs.
- This study compared 2 measures of self reported adherence with DBS to detect ARVs and estimates the accuracy of self reported adherence among HIV infected pregnant women in rural South Africa.

Methods & Materials

Study site and Participants

- Mpumalanga, South Africa
- 392 pregnant HIV infected women at week 32 of pregnancy 18 years of age or older

Measures (ACASI administered)

- Demographic and Medical History
- Dried Blood Spot Adherence
- Visual Analog Scale (VAS) 3-day Adherence
- AIDS Clinical Trials Group (ACTG Adherence)

Statistical Analyses

- ROC (receiver operating characteristic) curve analysis performance, area under the ROC curve (AUROC).
 - VAS and the ACTG using DBS as the gold standard.
- Sensitivity, Specificity, Negative Predictive Values (NPV), and Positive Predictive Values (PPV)
- Kappa Statistics.

Dried Blood Spot Adherence (TDF, EFV, and 3TC)

- Adherent: 2 or 3 drugs detected (TDF, EFV, or 3TC)

Visual Analog Scale (VAS) 3-day Adherence – self report

- Adherent: Taking all of their medication (past 3 days).

AIDS Clinical Trials Group (ACTG Adherence) – self report

- Adherent: Taking all ARV doses (past 3 days).



Results

Demographic Characteristics

- Median age was 28 ± 6
- 78% were unemployed
- 82% had at least one child
- 55% were diagnosed with HIV during the current pregnancy

DBS, VAS, and ACTG Adherence

DBS: 74% adherent and 26% nonadherent

VAS: 89% of women self-reported 100% adherence

ACTG: 80% of women self-reported 100% adherence

VAS relative to DBS

- AUROC = 0.543 - VAS performed poorly in predicting DBS adherence
- Kappa statistic κ = 0.101 – indicates slight intermeasure agreement
- Accuracy = 0.72 [0.67, 0.76]
- Sensitivity = 0.91 [0.87, 0.94]. Specificity = 0.18 [0.11, 0.27]
- PPV = 0.76 [0.71, 0.80]
- Negative predictive value (NPV) = 0.40 [0.26, 0.56]

ACTG relative to DBS

- AUROC = 0.538 - ACTG performed poorly in predicting DBS adherence
- Kappa statistic κ = 0.081 – indicates poor intermeasure agreement
- Accuracy = 0.67 [0.63, 0.72]
- Sensitivity = 0.82 [0.77, 0.86]. Specificity = 0.26 [0.18, 0.35]
- PPV = 0.76 [0.71, 0.81]
- NPV = 0.33 [0.23, 0.44]

Conclusion

- Self-reported adherence is poorly associated with biological markers.
- Validating self-report with biological markers is needed.
- Accurate assessment of ARV adherence is essential for clinical practice, intervention evaluation and PMTCT efforts.
- Levels of adherence by DBS are low during pregnancy, placing infants and partners at risk of acquiring HIV, an women at risk of drug resistance and HIV progression.
- Strategies are needed to enhance and accurately evaluate adherence to ARV among this vulnerable population
- Future studies and clinical trials should consider alternate biological assessments of adherence, e.g., hair sampling to evaluate long-term ARV uptake, viral load testing.
- Using DBS may be unrealistic due to cost and delays associated with obtaining results.
- Limitations: cross sectional design, lack of exact ARV levels, varying ARV detection windows, and lack of assessment of viral load.

Sources & Citations

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