Studying Pulmonary Function in HIV Positive Tanzanian Youth

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Introduction

The survival rate of vertically transmitted, pediatric, HIV infection has dramatically increased in the past 20 years. This has spurred further interest in studying the health of youth living with HIV. Of the chronic diseases that affect this population, chronic lung disease (CLD) is among the most prevalent. In a survey of acute hospitalizations of adolescents with HIV, it was found that 12% had chronic lung disease; second only to chronic skin disease.1,4 The purpose of this study is to investigate the pulmonary function of HIV positive Tanzanian children and compare the results to previous studies conducted in Zimbabwe and Malawi. This study will help determine the importance of monitoring lung function in HIV-infected youth and if a pulmonary treatment regimen should be instituted.

Methods

An ongoing cohort study of HIV-infected children between the ages of 8 and 18, being treated at the DarDar Pediatric program (DPP) in Dar Es Salaam, Tanzania is being completed. Pulmonary function is assessed using pulse oximetry and spirometry to measure forced expiratory volume at one second (FEV1), forced vital capacity (FVC), FVC/FEV1 ratio, and forced expiratory flow 25% to 75% (FEF25-75). Each participant is first evaluated at rest. Abnormal pulmonary function is defined as an FEV1 and/or FVC value <80% of the predicted value based on normative data from healthy Malawian youth. If the recorded values for FVC and FEV1 are >70% of predicted, they are re-evaluated after moderate exercise which consists of traversing two flights of stairs. All participants are then evaluated after administration of inhaled albuterol. The PFT data is analyzed in correlation with age and age at initiation of antiretroviral therapy.

Participants

Fifty participants were enrolled in this preliminary study; 47 participants successfully completed the protocol while 3 participants were excluded due to inconsistent PFT efforts. All participants were non-smokers, and had an oxygen saturation >95% on room air at rest.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n = 47</th>
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<tbody>
<tr>
<td>Sex, male</td>
<td>30 (64%)</td>
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<tr>
<td>Age, median years</td>
<td>13.2 ± 2.5</td>
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<tr>
<td>Current ART</td>
<td>40 (85%)</td>
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<tr>
<td>Years of ART, median</td>
<td>4.1 ± 3.0</td>
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<tr>
<td>Hx of TB/Pneumonia</td>
<td>21 (45%)</td>
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Results

1. The prevalence of pulmonary dysfunction, defined as a FEV1 or FVC less than 80% of predicted, was found to be 23% (11/47) (figure 1). This is comparable to the rates of pulmonary disease found in larger cohort studies.6

2. Pulmonary dysfunction is primarily restrictive. Of the 11 patients that displayed abnormal PFT results, 9 had both a decreased FEV1, and FVC with a normal to increased FEV1/FVC ratio, characteristic of a restrictive pattern (figure 2). This is consistent with the findings of a study of HIV positive Malawian children.6

3. Based upon our findings, there is currently no correlation with age or delayed onset of anti retroviral therapy (ART) and the presence of chronic lung disease.

4. This study is an ongoing study to reach a cohort of 150 patients, which will continue to help characterize the pattern of pulmonary disease in this population. The underlying lung pathology is unknown; dysfunction may be due to HIV infection and related inflammatory pathways. Our preliminary findings may inform future studies of causation and possible interventions.

Experience

Living in Dar Es Salaam was a bit of a surreal experience. For the first time in my life I was surrounded by people who looked like me, yet I was still an outsider. I was able to simultaneously blend in and stand out. In contrast to traveling in Europe, no one who I interacted with immediately pegged me for American. The Tanzanians were surprised to find an American in their homeland, as it is not a popular tourist destination. I was astounded by how apologetic the locals were, comments such as “Dar is kind of dirty, right?” were common.

While I was in Dar I had the opportunity to shadow in the neonatal intensive care unit of the national hospital. The attending jokingly commented, “I think the babies know we don’t have much,” and as three newborns less than 1 kg each shared a plastic bassinet in order to all lie under the one UV light in a room heated to 35 degrees Celsius because the hospital does not have incubators; I thought she might be right. That morning I watched as a full-term baby with meconium aspiration pass away as the doctors tried unsuccessfully to resuscitate her.

It is easy to feel hopeless and think “what could I possibly do to help close these gaps?” But I realized I had already accomplished something just by going to Dar. No one, especially an aspiring physician could travel to these areas and not be moved to do something. My trip to Dar changed me— it made me care and if we can just increase that number of people who care then maybe collectively we can begin to make a difference.

References


