Yoga practice improves sleep quality of people living with HIV on ART

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Sleep is a physiological state of self-regulation and resting. Sleep and sleep quality in people living with HIV are altered by many factors among which are: 1) Infection-itself, 2) The diagnosis, and 3) Treatment. Yoga is known for its beneficial effects on physiologic and psychological functions, besides it improves the quality of life of people. For these reasons, the objective of this study was to evaluate the effect of yoga practicing on sleep quality of people living with HIV on ART. One hundred twenty five people living with HIV without antecedent of practicing yoga were invited to participate in this study and 82 people agreed to participate in systematic yoga exercises for 30 min 3 times a week in a period of 8 weeks. Participants were later randomly assigned into one of the three yoga programs (only Asanas, only Pranayama and both Asanas-Pranayama). Quality of sleep was assessed using semi-structured interview focusing on the following sleep disturbances: 1) difficulty to fall asleep, 2) sleep less than 6 hours and 3) fragmented sleep. The analysis was performed using SPSS 21 for Windows software package. Results are expressed as the frequencies of sleep disturbances at the beginning and at the end of the study among study programs. Z-test for proportion differences was employed being significant P values < 0.05. The Yoga programs resulted in proportions differences, yet not significant, between starting and ending the study among sleep disturbances. However a significant proportion difference was found between Yoga practice (any program) and sleep disturbances (any); thus, we conclude that Yoga practice improves sleep quality of people living with HIV on ART.

Keywords: Sleep quality, Yoga, HIV, ART, Prospective study.

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Sleep is a physiological state of self-regulation and resting. During this process some hormones are produced, e.g. human growth hormone and others known as glucocorticoids1; also, sleeping has been associated with the production of immune molecules2. Sleep deficiency and deprivation is associated to some illnesses such as susceptibility to diabetes, cardiovascular risk, etc.3–5. Not only matter the amount of time spent sleeping, it is also important sleep quality as there are reports of consequences of fragmented sleep such as immunological, cognitive disorders and even brain damage6–8. The sleep cycle is studied between rapid-eye movement (REM) sleep and non-rapid-eye movement (NREM) sleep stages. The human sleep cycle varies between stages (REM and NREM) and across the night; even, electroencephalographic patterns also differ significantly across the night8. When sleep is fragmented, interrupted or shortened, enough time at certain stages of sleep may have not been spent which will have various deleterious impacts on health. Sleep is needed to think clearly, react quickly and consolidate the memory9. So, sleep has an important role in mental, emotional, and physiological health.

Sleep and sleep quality in people living with HIV (PLH) are altered by many factors among

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which are: 1) Infection-itself, 2) The diagnosis and 3) Treatment.

The infection itself has been associated with a change in the sleep quality of PLH particularly when PLH has developed AIDS, this change in the sleep quality is as frequent during the stage of AIDS when PLH are characterized by a state of impaired health and cachexia, a state in which PLH tend to sleep longer compared to people who only live with HIV and have not developed AIDS\textsuperscript{10-12}.

The diagnosis is another factor associated with impaired sleep quality of the PLH as during the process of grief that people go through when facing the diagnosis of infection; multiple thoughts are associated with psychological factors such as anxiety and depression which evidently have been associated with alterations in the quality and quantity of sleep\textsuperscript{13}.

Finally, the anti retro viral treatment (ART) has also been associated with problems in the sleep quality these alterations often result from the side effects of ART scheme, example of this is the efavirenz\textsuperscript{14,15} which has an affinity for the central nervous system\textsuperscript{16} and which directly affects the sleep patterns of the PLH. These sleep disturbances may be potentiated in a multivariate context, i.e., the negative effect on the quality and quantity of sleep in the PLH can be potentiated when considering multiple variables: Infection, diagnosis and treatment.

Yoga is an ancient heritage which includes physical, mental and spiritual practices\textsuperscript{17} known for its beneficial effects of physiologic and psychological functions. Besides, it improves the life quality of people\textsuperscript{18,19}. Recent studies reported that yoga decreases stress and anxiety and improves health status\textsuperscript{20} for this reason the objective of this study was to evaluate the effect of yoga practicing on sleep quality of people living with HIV on ART.

Materials and methods

Participants

This work took place according to the Helsinki declaration. A sample (n = 125) of PLH without antecedent of practicing yoga were invited to participate in this study. Participants without sleep disturbances were firstly excluded, those who agreed to participate in this work said they understood the purpose of the study and signed the informed-consent (n = 82) later they were random assigned into one of the three yoga programs. The PLH group was between 26 and 54 yrs old, middle socio-economic level, with access to ART and medical care in public institutions. All the participants were men.

Yoga programs

People agreed to participate in systematic yoga exercises for 30 min 3 times a week in a period of 8 weeks between May 15\textsuperscript{th} and July 8\textsuperscript{th}, 2016. The yoga module of each program included performing only Asanas, only Pranayama and both Asanas-Pranayama combinations according to Table 1.

Procedure

It was a cross-sectional prospective study of 8 weeks. A semi-structured interview was performed, in which knowledge addressed was about sleep disturbances, leading to three categories: 1) difficulty to fall asleep, 2) sleep less than 6 hrs and 3) fragmented sleep.

Statistical analysis

The analyses were performed using SPSS 21 for Windows software package. Results are expressed as the frequencies of sleep disturbances at the beginning and at the end of the study among study programs.

Table 1 — Yoga module according to each program

<table>
<thead>
<tr>
<th>Yogic techniques</th>
<th>Asanas</th>
<th>Pranayama</th>
<th>Asanas Pranayama</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ardhamatsyendrasana</td>
<td>1(1)</td>
<td>-</td>
<td>1(1)</td>
</tr>
<tr>
<td>Ardikhati chakrasana</td>
<td>1(1)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bhujangasana</td>
<td>1(1)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dhanurasaana</td>
<td>1(3)</td>
<td>-</td>
<td>1(2)</td>
</tr>
<tr>
<td>Gomukhasana</td>
<td>1(3)</td>
<td>-</td>
<td>1(2)</td>
</tr>
<tr>
<td>Naukasana</td>
<td>1(2)</td>
<td>-</td>
<td>1(1)</td>
</tr>
<tr>
<td>Parvatasana</td>
<td>1(2)</td>
<td>-</td>
<td>1(2)</td>
</tr>
<tr>
<td>Paschimottanasana</td>
<td>1(2)</td>
<td>-</td>
<td>1(2)</td>
</tr>
<tr>
<td>Pavanamuktasana</td>
<td>1(2)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Shavasana</td>
<td>1(3)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bhastrika pranayama</td>
<td>-</td>
<td>2(1,2)</td>
<td>1(1)</td>
</tr>
<tr>
<td>Bhramari pranayama</td>
<td>-</td>
<td>1(3)</td>
<td>-</td>
</tr>
<tr>
<td>Chandranadi pranayama</td>
<td>-</td>
<td>1(2)</td>
<td>1(2)</td>
</tr>
<tr>
<td>Nadasilatam Pranayama</td>
<td>-</td>
<td>2(1,2)</td>
<td>1(2)</td>
</tr>
<tr>
<td>Pranav pranayama</td>
<td>-</td>
<td>1(3)</td>
<td>-</td>
</tr>
<tr>
<td>Savitri pranayama</td>
<td>-</td>
<td>1(1)</td>
<td>1(1)</td>
</tr>
<tr>
<td>Vibhag pranayama</td>
<td>-</td>
<td>1(3)</td>
<td>1(2)</td>
</tr>
<tr>
<td>Vyagrah pranayama</td>
<td>-</td>
<td>1(2)</td>
<td>1(2)</td>
</tr>
</tbody>
</table>

Rest period

Number of exercises (Duration in minutes). $n_b$ = Sample size when starting the study; $n_e$ = Sample size when ending the study.
Z-test for proportion differences was employed being significant P values < 0.05.

**Results and discussion**

No significant proportions difference was found between the beginning and end of the study among yoga programs when stratifying according to sleep disturbances as shown in Table 2. Although the yoga programs were mutually exclusive, significant differences were not observed between each category of sleep disturbances, because sleep disturbances were not mutually exclusive; i.e., there were people with 2 or even 3 sleep disturbances, for example 4 people had difficulty to fall asleep and sleep less than 6 hrs; 5 people had fragmented sleep and sleep less than 6 hrs; 21 people had difficulty to fall asleep and fragmented sleep and 10 people had the three problems (as shown in the Venn-Euler diagram in Fig. 1). For this reason the effects of yoga programs in general (mutually exclusive variable) on any sleep disturbance in general (mutually exclusive variable) was analyzed finding a significant proportions difference (p < 0.001). The limitation of our work among sleep disturbances was because they were not mutually exclusive categories and the small sample size. Although when we analyzed the whole two variables: Yoga practice and sleep disturbance we found that Yoga practice improves sleep quality of PLH on ART we think this might be due, as other authors reported, to the observation that yoga practice reduces feeling of hopelessness, nervousness and loneliness with generally improved mood, hostility and insomnia7,12. Besides, it is known that every yoga class includes some time devoted to relaxation, aware regeneration of each part of the body, which gives a strong feeling of rejuvenation and energy restoration. Practicants usually comment that this part of the class is worth like a few hours of sleep.

**Conclusion**

The Yoga practice programs (Asanas, Pranayama and Asanas-Pranayama) resulted in proportions differences, yet not significant, between starting and ending the study among sleep disturbances. However, a significant proportion difference was found between Yoga practice (any) and sleep disturbances (any); thus, we conclude that Yoga practice improves sleep quality of people living with HIV on ART.

**Conflicts of interest**

The authors declare no conflict of interest.

**Acknowledgement**

The authors thank to all people who participated in this study.

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