

CASE REPORT

Open Access



Yoga Nidra: An innovative approach for management of chronic insomnia- A case report

Karuna Datta¹, Manjari Tripathi² and Hrudra Nanda Mallick^{1*}

Abstract

Background: Chronic insomnia is a common sleep problem and there is a need to complement the existing treatment options. *Yoga nidra* practice is documented to be used for sleep by sages. Recently, *yoga nidra* has been used in patients of menstrual abnormalities, post-traumatic stress disorder, diabetes, anxiety and depression but little is known about its effect on sleep or sleep disorders. Although we find description of *yoga nidra* in literature, there is no scientific report of its application in sleep disorders. The objective of the study was to develop *yoga nidra* model in management of chronic insomnia patients. The model was developed using inputs from *yoga* school trained instructors of *yoga nidra*.

Case presentations: Patient 01: 60 years old widower with complaints of sleep maintenance insomnia since 20 years. He had worry at daytime regarding falling off to sleep which became even worse at bedtime. He had history of benign prostatic hypertrophy and had no history of any medications for sleep or any other disease. Patient 02: 78 years old male self-employed, company owner with complaints of sleep maintenance insomnia since 15 years. He felt quite energetic during the day due to the work requirement but in the evening started feeling anxious about sleep problem which worsened at bedtime. He was on tablet clonazepam 0.25 mg HS off and on since 1 year. After the baseline assessment, *yoga nidra* intervention was started followed by five supervised sessions after which the patients were instructed to practice *yoga nidra* daily on their own. Regular fortnightly follow ups were done till 4 weeks of start of *yoga nidra* intervention. Repeat PSG was offered in case patient volunteered. Sleep diary parameters were analysed using Friedman test and Wilcoxon Signed Ranks test. There was an improvement in sleep quality, insomnia severity, depression anxiety and stress scores after *yoga nidra*. The improvement remained even after 3 months of start of intervention. Repeat PSG in second patient showed an increase in N3 after 4 weeks of *yoga nidra* intervention.

Conclusion: *Yoga nidra* can be used as an important adjunct in management of chronic insomnia patients.

Trial registration: CTRI/2013/05/003682 [Registered on: 27/05/2013] Trial Registered Retrospectively.

Keywords: *Yoga nidra*, Chronic insomnia, Intervention, *Yoga nidra* intervention model, Case report

Background

Chronic insomnia is a common sleep problem and is associated with increased morbidity and mortality (Taylor et al. 2007). Available treatment options include pharmacological and non-pharmacological approach. Studies have shown sleeping pill users at a greater mortality risk (Kripke et al. 2002) and though drugs like zolpidem have been found to be safe for short term use (Schutte-Rodin

et al. 2008) but when taken for years these medications also produce unwanted side effects like sleep related eating disorders and sleep walking (Hoque and Chesson 2009) and even increased cancer risk (Kao et al. 2012).

Non pharmacological approach using cognitive behavioral therapy for insomnia (CBTI) is considered beneficial. CBTI though remains the first line of therapy for insomnia but is often underutilized (Schutte-Rodin et al. 2008). Underutilisation of CBTI is reported because of reasons which are both patient centred and system based issues. Patient related reasons include time and cost

* Correspondence: drhmallick@yahoo.com

¹Department of Physiology, All India Institute of Medical Sciences, New Delhi, India

Full list of author information is available at the end of the article



involvement and limited availability of CBTI trained specialists being a major system based problem.

Complementary and alternative medicine in the form of Kundalini yoga (Khalsa 2004), Tai Chih Chi (Irwin et al. 2008), mindfulness meditation (Ong et al. 2014), acupuncture and Chinese herbal medicines have been tried in insomnia patients. There is a felt need to complement the existing gamut of treatment options for insomnia patients.

According to the ancient Indian scriptures, sages are known to sleep using *yoga nidra*. *Yoga Nidra* is derived from two Sanskrit words, 'Yoga' ('yuj' = yoke) meaning union or one pointed awareness and 'nidra' means sleep. *Yoga nidra* is derived from '*pratyahara*' of raja yoga and tantric practise of '*nyasa*'. In '*pratyahara*' mind and mental awareness are dissociated from the sensory channels. '*Nyasa*' means 'to place or to take the mind to that point'. *Yoga nidra* is documented as neither *nyasa* nor meditation as *yoga nidra* is done in supine position and unlike meditation which is an aware awake state, *yoga nidra* is considered as aware sleep state (Saraswati 1998). '*Nyasa*' is practised in sitting posture and involves the recitation of *mantras* in Sanskrit to experience different parts of the body which increases the scope of this practise beyond different cultures.

Yoga nidra was known to be practised by sages and it was passed on to their disciples traditionally. Swami Satyananda Saraswati, renowned teacher from Bihar School of Yoga, Munger, Bihar, India laid down the basics of learning *yoga nidra* in the form of a book. He described *yoga nidra* as a 'systematic method of inducing complete physical, mental and emotional relaxation and in this state the relaxation is achieved by turning inwards, away from outer experiences' (Saraswati 1998). It can be done following instructions from his book by a teacher or by a way of audio compact disc (CD).

Yoga nidra has been tried as a therapeutic option for many diseases. The relative ease of practise has made it an acceptable therapeutic option for many diseases. *Yoga nidra* has been used in patients of menstrual abnormalities (Rani et al. 2011), post-traumatic stress disorder (Stankovic 2011), diabetes (Amita et al. 2009), anxiety and depression (Rani et al. 2012) but little is known about its effect on sleep or sleep disorders.

Although we find description of *yoga nidra* in literature, there is no scientific report of its application in sleep disorders.

Since *yoga nidra* has been used as a therapeutic option with no documented side effects and it is mentioned related to sleep in scriptures, there was a felt need to develop this method as a model in management of chronic insomnia patients.

The objective of the study was to develop *yoga nidra* as a complementary model in management of chronic

insomnia patients. Authors had asked for volunteers through advertisement placed at various OPDs. Two patients aged 60 and 78 years, who volunteered for the model of *yoga nidra*, are discussed. They were explained about the nature of study and informed consent was obtained. The study was approved by the Institutional ethical committee of All India Institute of Medical Sciences, New Delhi, India (reference number IESC/T-394/02.11.2012).

Case presentations

Diagnosed chronic insomnia patients came from sleep clinic out patients department (OPD) of MT¹, senior neurologist and certified sleep specialist. They were on treatment and were referred to KD² in case they volunteered to add *yoga nidra* intervention to the already prescribed treatment. An informed consent from the patient was taken.

Inclusion criteria

Patients following usual sleep wake schedule during the study period. Patients with morning circadian preference were included. Patients who were keen to volunteer for the study were included and they had a right to withdraw anytime during the study.

Exclusion criteria

Any patient who was likely to plan an intercontinental flight or was not able to follow usual sleep wake schedule during the study period. Patients with evening circadian preference were excluded from the study. Morningness Eveningness Scale (MES) (Horne and Ostberg 1976; Paine et al. 2006) was used to screen patients and only those patients with a morning preference were taken. This was done as the patients should have been most alert at the time of *yoga nidra* session which was in the morning from 0900 h to 1130 h making it important to exclude patients with delayed circadian rhythm. The scale also assess the time of the morning when they were most alert which helped in planning the *yoga nidra* sessions further. We included morning preference also because we did not want circadian rhythm as a confounding factor since the effect of *yoga nidra* on circadian rhythm is not known.

Patients

Two patients Patient 01 and 02 underwent the intervention using *yoga nidra* model.

Patient 01: 60 years old widower with complaints of not able to sleep after getting up at night since 20 years for more than 30 min and more than three times a week. Patient had worry at daytime regarding falling off to sleep which became even worse at bedtime. Patient had history of benign prostatic hypertrophy and had no history of any medications for sleep or any other disease.

Patient 02: 78 years old male self-employed, company owner with complaints of not able to sleep after getting awake at night for more than 30 min and more than three times a week since 15 years. He felt quite energetic during the day due to the work requirement but in the evening started feeling anxious about sleep problem which worsened at bedtime. He was on tablet clonazepam 0.25 mg HS off and on since 1 year.

Development of a model for using *yoga nidra* in insomnia patients

KD² visited Bihar School of Yoga, Munger and attended sessions of *yoga nidra* taken by teachers. Permission to use *yoga nidra* for chronic insomnia patients was taken. She had discussions with the teachers and doctor in the school. The teachers brought out the usual problems faced during conducting and also while doing the session oneself. KD² also did sessions herself under supervision while in ashram to get a hands-on feel of the session which would help planning for the patients subsequently. Planning of the session was done keeping the discussion in mind. The patients were taught using pre-recorded audio CD on *yoga nidra*© from the school which are easily available for sale.

The discussion brought out that a *yoga nidra* session every day for 3 to 4 days as done in short yoga programmes helps their subject to make them comfortable during the session. It was also pointed out that at times the instructions are not clear to all the subjects and might require elaboration on an individual basis. Keeping these points in mind five supervised sessions were planned continuously every day for 5 days. The method of doing *yoga nidra* involves seven steps namely – preparation, samkalpa (samkalpa = idea or notion formed in the heart or mind), body part awareness or rotation of consciousness, breath awareness, feeling and sensation, visualization and ending of practice (Sarawati 1998).

Planning of the Model included three basic parts

- a) Assessment for readiness and voluntary participation
Discussion with yoga teachers and doctor at the school brought out that the subject has to be ready for taking a session as it included voluntarily following the instructions without sleeping. It was suggested by the Bihar school of yoga teachers that the session should be carried out when the person is most alert to avoid sleep during the session. Since the sessions were done in the morning hours, we excluded patients with an evening circadian preference in the study.
The patient was verbally informed that this method was novel and though has been tried in other diseases with no reported side effects but it was

essential to follow up closely for initial days requiring the patient to report daily for a minimum of 5 days initially and subsequently for follow ups. Since it required time, volunteering was an indirect measure of the commitment of the patient towards the management. The patient was free to withdraw from the study at any time of the intervention. The patient was then briefed about *yoga nidra*, its philosophy and available reports of its use as a therapeutic option. Then baseline assessment was completed and documented.

- b) Supervised sessions
Initial five daily supervised sessions at the time when they are most alert during daytime was planned. Each session takes approximately 30 min. Before the start of the session, the patient was instructed to make himself comfortable. Since, insomnia patients are sensitive to changes in their daily routine on sleep (basic premise for use of principles of sleep hygiene and education), intervention like *yoga nidra* is likely to affect sleep and hence the patients were kept under direct supervision of a certified sleep specialist. The constant supervision was maintained by KD at all times, initially by planning daily supervised sessions and the monitoring using sleep diary/development of any new symptoms specifically for potential side effects (Edinger et al. 2015) and informing about regular follow ups.

What to do during the session for the observer

The patient was not interrupted during the session. Signs of restlessness e.g. tossing and turning, moving hands, shutting eyes too tightly, not looking relaxed etc. were observed. Cues of whether the patient was following instructions were carefully noted e.g. When the instructor asked the subject to take a deep breath, or look down while keeping eyes closed, the observer made a note of whether the patient followed. In case the patient was found not following instructions or appeared restless, time of the practise was noted from the player and subsequently discussed after the session.

Discussion by the observer with the patient after the session

- I. The patient was asked of the various phases of *yoga nidra* (as mentioned in 'Additional file 1') he felt he went through. This is extremely important as *yoga nidra* is considered very relaxing and might put an insomnia patient to sleep despite being the most alert time of the day for him. According to the experienced teachers usually there is 50% retention of the basic various phases by the second day of practise. The practising subjects on an average start remembering all the different phases by the end of

the fourth day. We gave 5 days considering some insomnia patients might fall sleepy during the sessions. Then the patients were asked to practise the session at home every day.

- II. Patients were now asked about the problem faced during the session. The noted time points by the observer where he felt the patient was not following were also discussed. In case any clarifications regarding the instructions were required they were provided so as to better the next session.
- III. The patient was also encouraged to listen to the tape at home after the first supervised session and was instructed to write down instructions which were not clear to the patient. This was done to increase his compliance during the subsequent sessions. These points of the patient were discussed the next day before starting the next day session as advised by yoga school since it relieves anxiety of the patient.
- IV. The entire session was then discussed with the patient as to how he feels it went, the patient was assured and instructed to follow the instructions as they were and not analyse or worry about them.

Yoga nidra intervention was done using a copyrighted pre-recorded *Yoga Nidra* audio CD approximately 27.2 min from Bihar School of Yoga, Munger, Bihar, India. Conduct of *yoga nidra* session was done in a sound proof room, with minimal ambient lighting during daytime. The subject was made to lie in the supine posture on a comfortable mattress. The entire session was done in *shavasana* (*shava* means “corpse” and *asana* means “posture”). The posture used for this asana is lying on the back, the arms and legs are kept at about 45° with the palms facing upwards. A soft pillow is optional to give maximum comfort to the patient while the entire session. This posture minimises the contact points especially between the limbs of the body. Brief outline of practise of doing *yoga nidra* and general instructions given to subjects is attached in ‘Additional file 1’ (Saraswati 1998).

Outcome measures

- a) Sleep diary– Sleep diary was used by the patients to mark the daily activities. This could be filled on paper or on an excel sheet according to the patients choice.

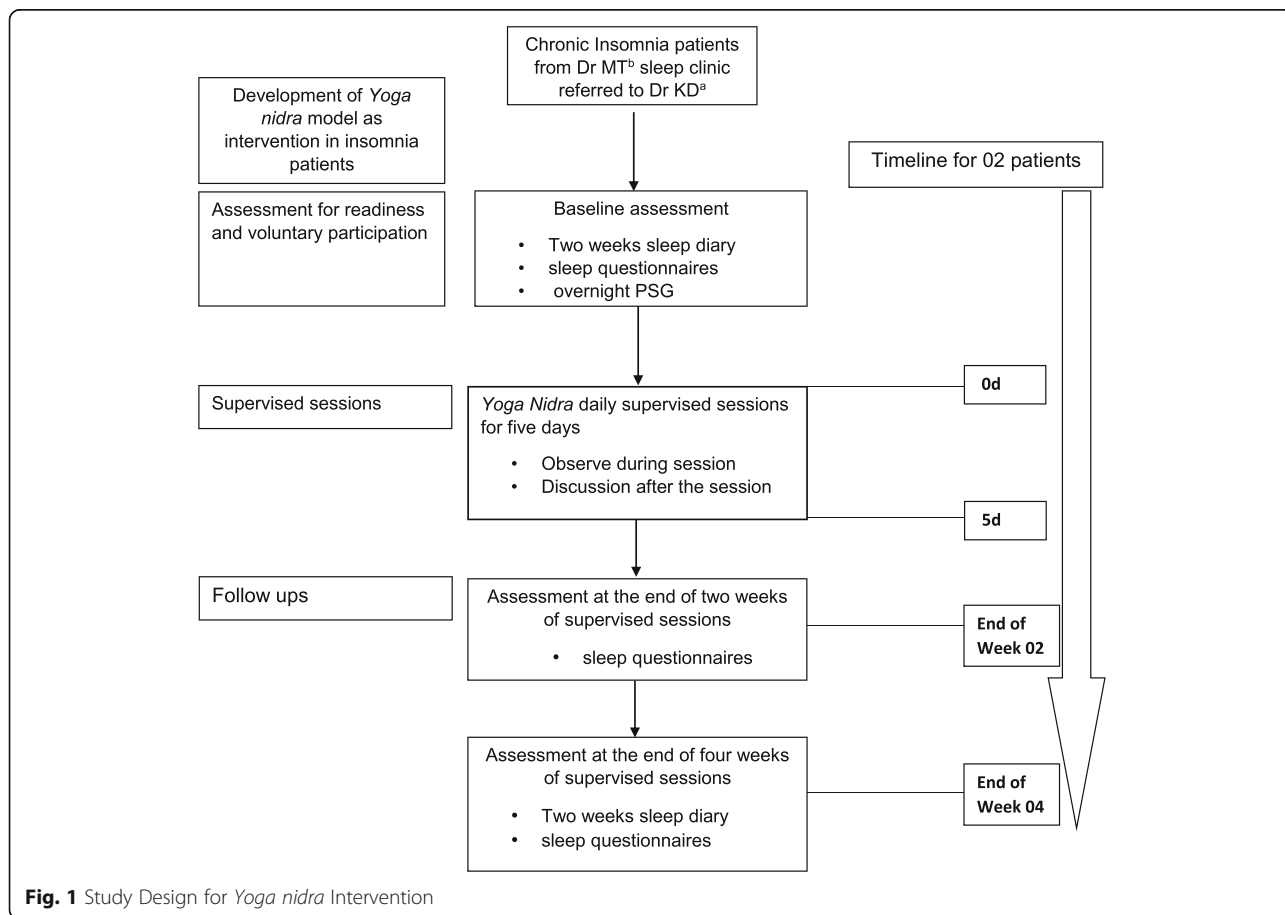


Fig. 1 Study Design for *Yoga nidra* Intervention

The diary was to be filled twice a day, once in the morning on getting up and then again at night just before bedtime. The individual fills in the details of time of lying in bed, approximate time required to fall asleep, wake up time, number of breaks in sleep and the approximate time that the individual feels that he was awake before falling off to sleep. Sleep quality on a scale of 10 was also reported in the diary along with other details of time of meals, exercise and time of *yoga nidra*. Parameters calculated using 2 weeks sleep diary were- Time in Bed (TIB): the total time the individual was lying in the bed i.e. the number of hours from the time of lying in bed to time of finally waking up; Sleep Onset Latency (SOL): the time initially spent in bed trying to sleep after lying in bed to sleep; Wake After Sleep Onset (WASO): time spent awake in bed after initially sleeping and before finally waking up; Total Sleep Time (TST): TST can be calculated by subtracting the SOL and WASO from TIB; Sleep Efficiency: calculated by the formula- (TST/TIB)

x100; Total Wake Duration (TWD): SOL + total time of sleep breaks. These parameters were calculated for each night for the patient. Day 01st to 14th represent baseline, 15th day represents the first day of *yoga nidra* intervention, 28th -41st was used for the data analysis i.e. when the patient came for fourth week follow up. Baseline sleep diary was a mandatory requirement as is considered an important tool in assessing sleep in an insomnia patient.

- b) Sleep questionnaires- Pittsburgh Sleep Quality Index (PSQI) (Buysse et al. 1989), Insomnia Severity Index (ISI) (Morin et al. 2011), Depression Anxiety Stress Scale (DASS) (Lovibond and Lovibond 1995; Brown et al. 1997) Epworth Sleepiness Scale (“ESS © MW JOHNS 1990–1997. USED UNDER LICENSE”) (Johns 1991) Pre Sleep Arousal Scale (PSAS) (Nicassio et al. 1985).
- c) Digital polysomnography (PSG) - Overnight PSG was done using Somnomedics© PSG system, Germany with the standard montage. Electroencephalography (EEG), Electro-oculography

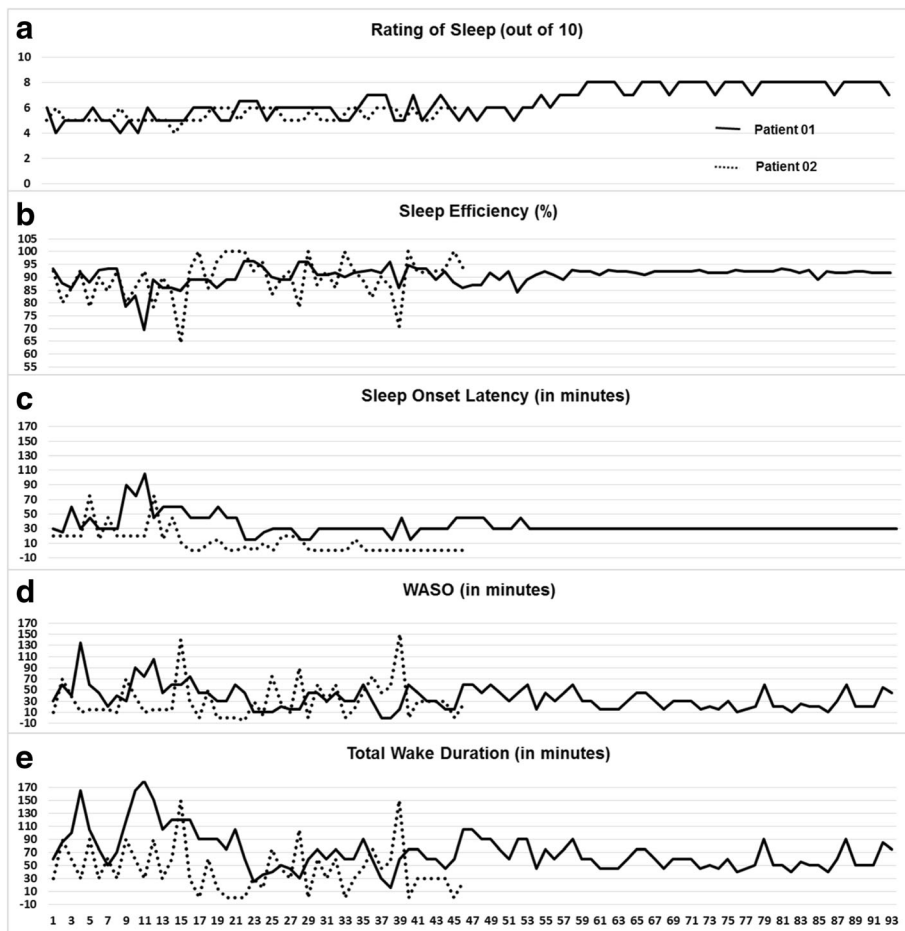


Fig. 2 a-e Sleep diary records of both patients

(EOG) and Electromyography (EMG) were sampled at 256 Hz. The low frequency and high frequency filter setting were EEG-0.3,35 Hz; EOG-0.3,35 Hz; EMG-10,256 Hz; EEG, EOG and EMG channels were placed along with pulse oximeter, RIP belts for thoracic and abdominal movements, Electrocardiography (ECG), oronasal pressure cannula and thermistor sensors according to American Association of Sleep Medicine (AASM) guidelines (Berry et al. 2014). Notch filter at 50 Hz was put and simultaneous video monitoring was done with the PSG device during the entire night. This was done in MT¹ sleep lab by technicians. The staging of the sleep was done using AASM criteria and relative percentages of various sleep stages were calculated. Parameters like TIB, TST, WASO, SPT, Sleep Period Time (TST+ WASO), SOL: Time from start of recording to first epoch of sleep and, REM Latency, SE = TSTx100/TBT were calculated. Various stages of rapid eye movement sleep (REM) and Non REM sleep (N1, N2, N3) were scored and calculated as percentage of TST and TIB.

Follow ups

Two fortnightly follow ups were considered mandatory for the patients after the start of *yoga nidra* intervention. During this study, patients were also instructed to meet MT¹ at least at the end of the month and at any time when the patient felt he deteriorated during this intervention.

Assessment of outcome measures

Primary outcome measures which were considered for improvement of patients were related to sleep and also improvement in daytime functioning (Edinger et al. 2015). These were sleep diary parameters -total sleep time, total wake duration, overall rating of sleep quality and Insomnia Severity Index for assessment of sleep. Day time functioning was evaluated by depression anxiety and stress scores during daytime using DASS and sleepiness during the day using “ESS @ MW JOHNS 1990–1997 (Johns 1991). USED UNDER LICENSE”. Pre sleep arousal scale was also used. From this scale a total score, somatic and cognitive score of pre sleep arousal were calculated. A reduction in these scores occurs with reduction in pre sleep arousal. An increase in insomnia severity index,

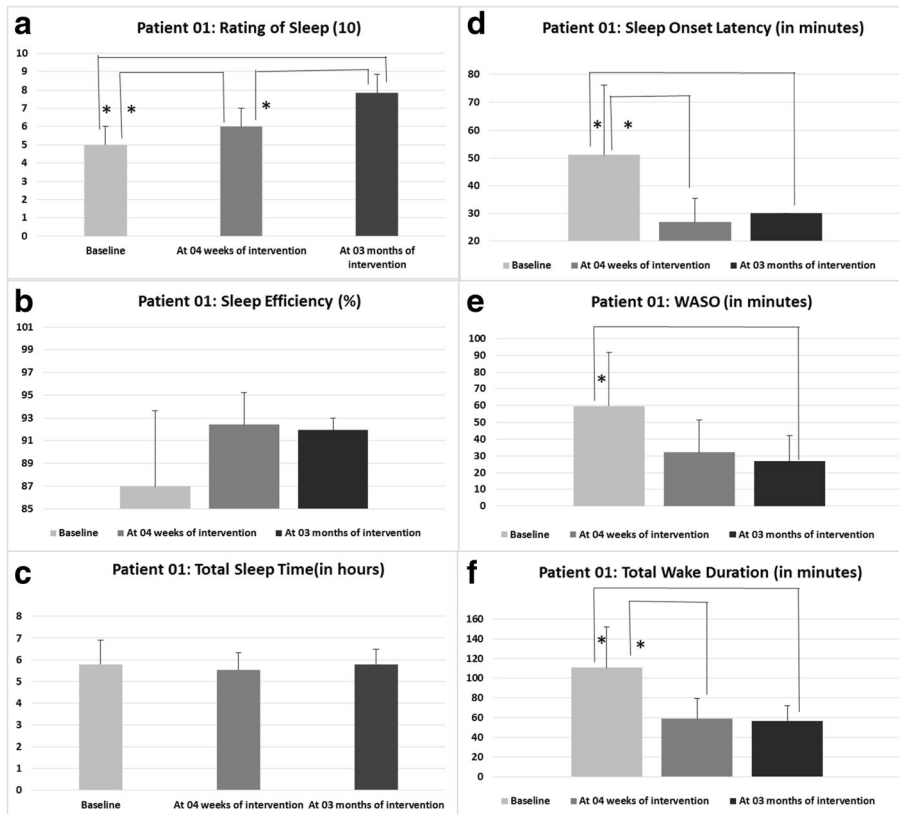


Fig. 3 a-f Sleep diary parameters of patient 01 showing various sleep wake parameters. * $p < 0.025$ (using Wilcoxon Signed Rank test and adjusted Bonferroni correction $p < 0.05/2 = 0.025$)

ESS©MW JOHNS 1990–1997 (Johns 1991) and DASS shows increase in severity in insomnia, increase in daytime sleepiness and increase in depression, anxiety and stress scores respectively.

Study design consisting of first 2 weeks of baseline followed by intervention using supervised *yoga nidra* training is shown in timeline in Fig. 1.

Baseline assessment

After obtaining informed consent from the patient, as a baseline assessment apart from the 2 weeks sleep diary the patients had to fill sleep questionnaires ISI, “ESS (Johns 1991) © MW JOHNS 1990–1997. USED UNDER LICENSE”, PSQI and pre sleep arousal scale. Patients also filled MES which was used to screen subjects and only those with morning preference were used for the study. Baseline PSG was done. This was done not only to assess insomnia but also to document presence of other sleep disorders.

Yoga nidra supervised sessions

Yoga nidra training was done using copyrighted CD. After 05 days of *yoga nidra* training under supervision, the patients were instructed to practice *yoga nidra* at home daily at a time when he was alert.

Assessment at the end of two weeks

PSQI, “ESS (Johns 1991) © MW JOHNS 1990–1997. USED UNDER LICENSE”, ISI, and PSAS and patient were instructed to fill sleep diary for the next 14 days.

Assessment at the end of four weeks

Questionnaires like PSQI, “ESS (Johns 1991) © MW JOHNS 1990–1997. USED UNDER LICENSE”, ISI, and PSAS were completed by the patient and 2 weeks sleep diary of the past 2 weeks was collected as assessed.

Outcomes

Sleep diaries for both the patients were analysed. Patient 01 filled the diary continuously till 93rd day i.e. 79th day after intervention (93-14 = 79) and patient 02 till 46th day i.e. 32nd day after starting intervention. Analysis of sleep diary was done as: baseline1-14; at 1 month-28–41 day and for patient 01 at 3 months as 79–93 day. Various sleep diary parameters are shown schematically for patient 01 and 02 in Fig. 2.

Sleep diary parameters of patient 01 showed significant changes in sleep onset latency (Friedman χ^2 (2) = 12.606, $p < .005$), WASO (Friedman χ^2 (2) = 7.370, $p < .05$), TWD (Friedman χ^2 (2) = 16.618, $p < .005$) and rating of sleep on a scale of 0 to 10 (Friedman χ^2 (2) = 23.192, $p < .0005$).

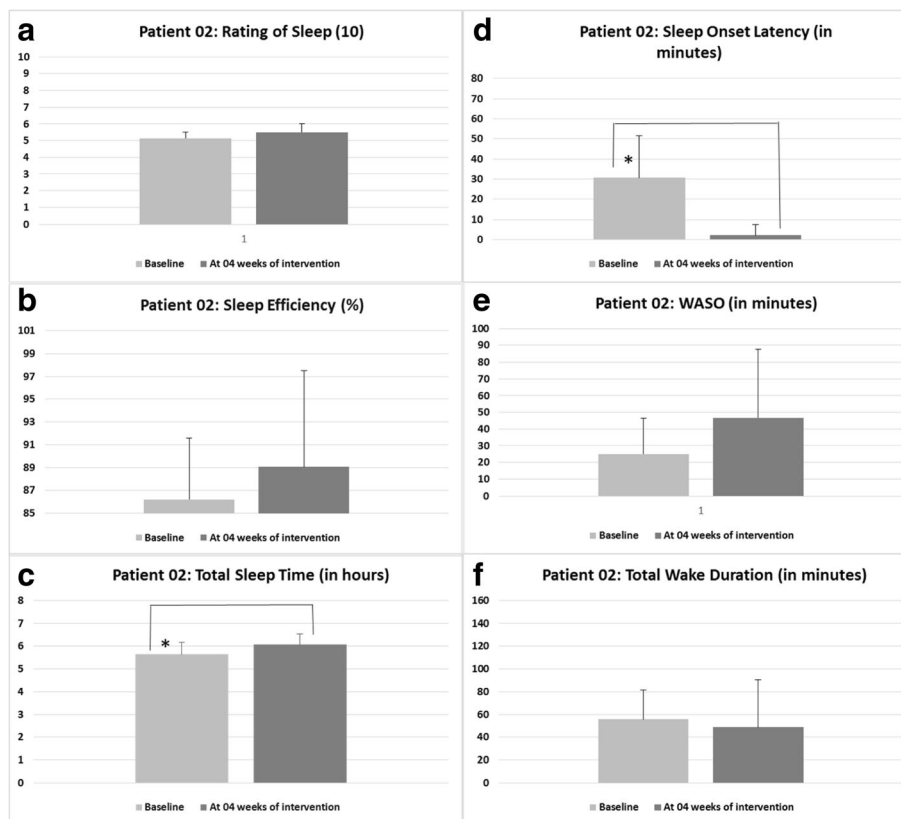


Fig. 4 a–f Sleep diary parameters of patient 02 showing various sleep wake parameters. * $p < 0.05$ (using Wilcoxon Signed Rank test)

Table 1 Questionnaires of patient 01 during the intervention and at follow ups

Questionnaire	Patient 01				
	Baseline	Mid intervention after 14 days	After 04 weeks of intervention	Three months Post intervention	Six months Post intervention
Insomnia Severity Index	13	10	5	3	4
PSAS Total score	28	26	20	18	18
PSAS Total somatic score	8	8	8	8	8
PSAS Total Cognitive score	20	18	12	10	10
PSQI Total 0–21	8	- ^a	5	4	4
Depression of DASS	2	0	0	0	0
Anxiety of DASS	0	0	0	0	0
Stress of DASS	4	2	0	0	0
ESS ^b	13	10	5	3	3

^aPSQI is filled keeping past 1 month in mind and hence was not collected at 14 days of intervention

^b ESS (Johns 1991) © MW JOHNS 1990–1997. USED UNDER LICENSE

Results of post hoc tests are shown in Fig. 3. Sleep diary parameters of patient 02 are shown in Fig. 4. Significant improvement was found in SOL and TST as shown in the figure.

On regular visits patients were asked about the anxiety and worry regarding falling asleep. They reported an improvement in the problem. Our patients did not report any headaches, drowsiness, or any daytime symptom of excessive sleepiness. The ISI, DASS and PSAS scores were also noted. Questionnaire results for both patients are shown in Tables 1 and 2. Baseline PSG data of both patients did not show association of any other sleep

problem. The latencies and percentage of different stages is shown in Table 3 along with repeat PSG of Patient 01 who volunteered to undergo repeat PSG after 04 weeks of intervention.

Discussion and Conclusions

After *yoga nidra* intervention, we found significant changes in sleep parameters. In the first patient total sleep time did not change significantly though sleep onset latency and WASO improved significantly. In our study patients were instructed about sleep hygiene principles as a result of which excessive lying in bed was reduced. That may explain improvement in sleep onset latency in this patient. In the second patient both total sleep time and sleep onset latency showed improvement with no significant changes in WASO. *Yoga nidra* has been found to be associated with shift towards parasympathetic dominance (Markil et al. 2012). High cardiac vagal control is related to better subjective and objective sleep quality (Werner et al. 2015). Yoga practise in the morning has been found to increase parasympathetic drive at night (Patra and Telles 2010) causing sleep to be more restorative which may explain significant improvement in sleep quality ratings and WASO. N3% TST improved with intervention which is a reliable indicator in PSG in insomnia (Israel et al. 2012). This increase in slow wave sleep may be responsible for the improved sleep quality. The probable mechanisms which might affect sleep quality and subjectively feeling better may be linked to cognitive structuring effects of these practices which make the mental processing of external inputs more relaxed (Deepak 2002). Though probable mechanisms involved with *yoga nidra* are not clear at present but mindfulness meditation is known to target deficits in executive attention which characterise mood and anxiety (Ainsworth et al. 2013) and psychological symptoms (Smernoff et al. 2015). Reduction in sympathetic arousal

Table 2 Questionnaires of patient 02 during the intervention and at follow ups

Questionnaire	Patient 02			
	Baseline	Mid intervention after 14 days	After 04 weeks of intervention	Three months Post intervention
Insomnia Severity Index	12	5	0	0
PSAS Total score	55	36	33	39
PSAS Total somatic score	15	11	11	13
PSAS Total Cognitive score	40	25	22	26
PSQI Total 0–21	11	- ^a	10	1
Depression of DASS	10	11	1	2
Anxiety of DASS	5	13	3	0
Stress of DASS	17	19	9	0
ESS ^b	4	6	6	3

^aPSQI is filled keeping past 1 month in mind and hence was not collected at 14 days of intervention

^b ESS (Johns 1991) © MW JOHNS 1990–1997. USED UNDER LICENSE

Table 3 PSG parameters of both patients

PSG Parameters	Patient 01		Patient 02
	Baseline	After 04 weeks of intervention	Baseline
TIB (min)	434	351	496
TST (min)	298	294	415
SPT (min)	421	337	477
SOL (min)	04	03	06
Sleep Efficiency (%)	68.6	83.8	83.6
WASO (min)	131	56	75
WASO/TST	0.44	0.19	0.18
ROL (min)	158	125	81
WAKE duration (min)	135	59	81
Wake % TIB	31.2	16.2	16.4
N1 duration (min)	101	79	45
N1 %TIB	23.3	22.6	9
N1 % TST	33.9	27	10.7
N2 duration (min)	112	79	309
N2 % TIB	25.7	39.7	62.2
N2 % TST	37.5	47.4	74.5
N3 duration (min)	61	139	1
N3 %TIB	13.9	39.7	0.2
N3 % TST	20.3	47.4	0.2
REM duration (min)	25	40	
REM %TIB	5.6	11.2	12.2
REM %TST	8.2	13.4	14.6

and reduced emotional states are the probable reasons for improvement in insomnia patients with mindfulness meditation (Ong et al. 2014; Morin et al. 1992; Ong et al. 2008; Ong et al. 2009; Martires and Zeidler 2015).

In our patients *yoga nidra* did not reduce total sleep time unlike a study on meditators where a reduced sleep need due to meditation was proposed (Kaul et al. 2010). *Yoga nidra* has been used in diseases and has been found to reduce perceived stress and anxiety (Rani et al. 2011; Stankovic 2011; Amita et al. 2009; Rani et al. 2012). In our patient we found improvement in depression and anxiety scores at 3 months of intervention. At 2 weeks patient 02 showed increased anxiety and stress and that may be attributable to his personal commitment of a business trip and his apprehension of doing *yoga nidra* which became better in subsequent trips. This is important to understand while planning this model that initial support is important during initial 3 to 4 weeks of intervention. Following the *yoga nidra* model planned for the patients there was no adverse effect reported but it is important that the intervention be given under supervision of a sleep practitioner because the changes seen in the patients need to be assessed and

monitored specially when an increased association to have anxiety, other somatic complaints like headaches, nausea is likely to be more in insomnia patients with mind body therapies including meditation (Jacobsen and Edinger 1982; Carlson and Nitz 1991).

This highlights the differences between patients and meditators and hence the medical supervision of these patients is extremely important.

Yoga nidra is easy to administer, relatively safe and does improve sleep in chronic insomnia. Another advantage of *yoga nidra* model is, that after the first five supervised sessions the patient is not dependant on the therapist, on the contrary he can do it all by himself in the comfort of his own house. This also gives confidence to the patient and alleviates his anxiety as seen in one of our patient. This may be one of the important factors for sustained improvement in anxiety and stress in both patients at 3 months of intervention.

The model developed for *yoga nidra* intervention can be used in chronic insomnia patients as an adjunct in management of chronic insomnia. Initial monitoring by a sleep physician should be done during 3 to 4 weeks of intervention. Though there are potential benefits of *yoga nidra* in insomnia patients, exact mechanism of *yoga nidra* is not yet clear. In our study both the volunteers were of elderly age group. Another limitation of our study is that in this case report there is a limited sample size (2 cases), so no firm conclusions can be drawn yet, until further studies are done on a larger number of patients. The efficacy of *yoga nidra* can be better understood in a randomised controlled trial in comparison to CBTI preferably in a younger age group.

Endnotes

¹Second author: Dr Manjari Tripathi- MT

²First author: Dr Karuna Datta- KD

Additional file

Additional file 1: Brief Outline of *Yoga nidra*. (PDF 26 kb)

Abbreviations

AASM: American association of sleep medicine; CBTI: Cognitive behavioural therapy for insomnia; CD: Compact disc; DASS: Depression anxiety and stress scale; ECG: Electrocardiography; EEG: Electroencephalography; EMG: Electromyography; EOG: Electrooculography; ESS © MW JOHNS 1990–1997. USED UNDER LICENSE: Epworth sleepiness scale; ISI: Insomnia severity index; MES: Morningness eveningness scale; N1, 2, 3: Non REM stages as per AASM scoring criteria; OPD: Out patients department; PSAS: Pre sleep arousal scale; PSG: Polysomnography; PSQI: Pittsburgh sleep quality index; REM: Rapid eye movement; SOL: Sleep onset latency; SPT: Sleep period time; TIB: Time in bed; TST: Total sleep time; TWD: Total wake duration; WASO: Wake after sleep onset

Acknowledgements

The authors acknowledge the support of Bihar School of Yoga Munger, Bihar, India for providing valuable inputs, books, literature and blessings in

designing and completing the study. Authors are also thankful to the sleep technicians of MT sleep lab who conducted overnight polysomnography for the study. Authors thank MAPI trust for granting permission to use ESS "ESS contact information and permission to use: MAPIResearch Trust, Lyon, France. E-mail: PROinformation@mapi-trust.org – Internet: www.mapi-trust.org".

Funding

Funding for the study was provided from the department and Institute (All India Institute of Medical Sciences New Delhi, India) funds and resources. No separate funding agency was involved in the design of the study and collection, analysis, and interpretation of data and in writing the manuscript.

Availability of data and materials

The datasets during and/or analysed during the current study available from the corresponding author on reasonable request.

Authors' contributions

HM and MT helped KD design the study. Data collection was done by KD under guidance of MT. Analysis and interpretation of results and writing the manuscript was done by KD with guidance of HM and MT. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

Consent for publication

Not Applicable.

Ethics approval and consent to participate

A statement on ethics approval and consent provided in the methods section along with the reference number. The Institute Ethics Committee of All India Institute of Medical Sciences New Delhi, India approved the study and the reference number is IESC/T-394/02.11.2012.

'All the patients were explained about the nature of study and informed consent obtained. The study was approved by the Institutional ethical committee of All India Institute of Medical Sciences, New Delhi, India (reference number IESC/T-394/02.11.2012).'

Author details

¹Department of Physiology, All India Institute of Medical Sciences, New Delhi, India. ²Department of Neurology, All India Institute of Medical Sciences, New Delhi, India.

Received: 7 October 2016 Accepted: 19 January 2017

Published online: 12 April 2017

References

- Ainsworth B, Eddershaw R, Meron D, Baldwin DS, Garner M. The effect of focused attention and open monitoring meditation on attention network function in healthy volunteers. *Psychiatry Res.* 2013;210:1226–31.
- Amita S, Prabhakar S, Manoj I, Harinder S, Pavan T. Effect of yoga-nidra on blood glucose level in diabetic patients. *Indian J Physiol Pharmacol.* 2009;53:97–101.
- Berry RB, Brooks R, Gamaldo CE, Harding SM, Lloyd RM, Marcus CL, Vaughn BV, for the American Academy of Sleep Medicine. The AASM Manual for the Scoring of Sleep and Associated Events: Rules, Terminology and Technical Specifications, Version 2.0.3. Darien: American Academy of Sleep Medicine; 2014. www.aasmnet.org.
- Brown TA, Chorpita BF, Korotitsch W, Barlow DH. Psychometric properties of the depression anxiety stress scales (DASS) in clinical samples. *Behav Res Ther.* 1997;35:79–89.
- Buysse DJ, Reynolds CF, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh sleep quality index: a new instrument for psychiatric practice and research. *Psychiatry Res.* 1989;28:193–213.
- Carlson CR, Nitz AJ. Negative side effects of self-regulation training: relaxation and the role of the professional in service delivery. *Biofeedback Self-Regul.* 1991;16:191–7.
- Deepak KK. Neurophysiological mechanisms of induction of meditation: a hypothetico-deductive approach. *Indian J Physiol Pharmacol.* 2002;46:136–58.
- Edinger JD, Buysse DJ, Deriy L, Germain A, Lewin DS, Ong JC, et al. Quality measures for the care of patients with insomnia. *J Clin Sleep Med JCSM Off Publ Am Acad Sleep Med.* 2015;11:311–34.
- Hoque R, Chesson AL. Zolpidem-induced sleepwalking, sleep related eating disorder, and sleep-driving: fluorine-18-fluorodeoxyglucose positron emission tomography analysis, and a literature review of other unexpected clinical effects of zolpidem. *J Clin Sleep Med JCSM Off Publ Am Acad Sleep Med.* 2009;5:471–6.
- Horne JA, Ostberg O. A self-assessment questionnaire to determine morningness-eveningness in human circadian rhythms. *Int J Chronobiol.* 1976;4:97–110.
- Irwin MR, Olmstead R, Motivala SJ. Improving sleep quality in older adults with moderate sleep complaints: a randomized controlled trial of Tai Chi Chih. *Sleep.* 2008;31:1001–8.
- Israel B, Buysse DJ, Krafty RT, Begley A, Miewald J, Hall M. Short-term stability of sleep and heart rate variability in good sleepers and patients with insomnia: for some measures, one night is enough. *Sleep.* 2012;35:1285–91.
- Jacobsen R, Edinger JD. Side effects of relaxation treatment. *Am J Psychiatry.* 1982;139:952–3.
- Johns MW. A new method for measuring daytime sleepiness: the Epworth sleepiness scale. *Sleep.* 1991;14:540–5.
- Kao C-H, Sun L-M, Liang J-A, Chang S-N, Sung F-C, Muo C-H. Relationship of zolpidem and cancer risk: a Taiwanese population-based cohort study. *Mayo Clin Proc.* 2012;87:430–6.
- Kaul P, Passafiume J, Sargent CR, O'Hara BF. Meditation acutely improves psychomotor vigilance, and may decrease sleep need. *Behav Brain Funct BBF.* 2010;6:47.
- Khalsa SBS. Treatment of chronic insomnia with yoga: a preliminary study with sleep-wake diaries. *Appl Psychophysiol Biofeedback.* 2004;29:269–78.
- Kripke DF, Garfinkel L, Wingard DL, Klauber MR, Marler MR. Mortality associated with sleep duration and insomnia. *Arch Gen Psychiatry.* 2002;59:131–6.
- Lovibond PF, Lovibond SH. The structure of negative emotional states: comparison of the depression anxiety stress scales (DASS) with the beck depression and anxiety inventories. *Behav Res Ther.* 1995;33:335–43.
- Markil N, Whitehurst M, Jacobs PL, Zoeller RF. Yoga Nidra relaxation increases heart rate variability and is unaffected by a prior bout of Hatha yoga. *J Altern Complement Med N Y N.* 2012;18:953–8.
- Martires J, Zeidler M. The value of mindfulness meditation in the treatment of insomnia. *Curr Opin Pulm Med.* 2015;21:547–52.
- Morin CM, Gaulier B, Barry T, Kowatch RA. Patients' acceptance of psychological and pharmacological therapies for insomnia. *Sleep.* 1992;15:302–5.
- Morin CM, Belleville G, Bélanger L, Ivers H. The Insomnia Severity Index: psychometric indicators to detect insomnia cases and evaluate treatment response. *Sleep.* 2011;34:601–8.
- Nicassio PM, Mendlowitz DR, Fussell JJ, Petras L. The phenomenology of the pre-sleep state: the development of the pre-sleep arousal scale. *Behav Res Ther.* 1985;23:263–71.
- Ong JC, Shapiro SL, Manber R. Combining mindfulness meditation with cognitive-behavior therapy for insomnia: a treatment-development study. *Behav Ther.* 2008;39:171–82.
- Ong JC, Shapiro SL, Manber R. Mindfulness meditation and cognitive behavioral therapy for insomnia: a naturalistic 12-month follow-up. *Explore N Y N.* 2009;5:30–6.
- Ong JC, Manber R, Segal Z, Xia Y, Shapiro S, Wyatt JK. A randomized controlled trial of mindfulness meditation for chronic insomnia. *Sleep.* 2014;37:1553–63.
- Paine S-J, Gander PH, Travier N. The epidemiology of morningness/eveningness: influence of age, gender, ethnicity, and socioeconomic factors in adults (30–49 years). *J Biol Rhythms.* 2006;21:68–76.
- Patra S, Telles S. Heart rate variability during sleep following the practice of cyclic meditation and supine rest. *Appl Psychophysiol Biofeedback.* 2010;35:135–40.
- Rani K, Tiwari S, Singh U, Agrawal G, Ghildiyal A, Srivastava N. Impact of Yoga Nidra on psychological general wellbeing in patients with menstrual irregularities: a randomized controlled trial. *Int J Yoga.* 2011;4:20–5.
- Rani K, Tiwari S, Singh U, Singh I, Srivastava N. Yoga Nidra as a complementary treatment of anxiety and depressive symptoms in patients with menstrual disorder. *Int J Yoga.* 2012;5:52–6.
- Saraswati S. Bihar School of Yoga. Yoga nidra. Munger: Yoga Publications Trust; 1998.
- Schutte-Rodin S, Broch L, Buysse D, Dorsey C, Sateia M. Clinical guideline for the evaluation and management of chronic insomnia in adults. *J Clin Sleep Med JCSM Off Publ Am Acad Sleep Med.* 2008;4:487–504.
- Smernoff E, Mitnik I, Kolodner K, Lev-Ari S. The effects of "The Work" meditation (Byron Katie) on psychological symptoms and quality of life—a pilot clinical study. *Explore N Y N.* 2015;11:24–31.

- Stankovic L. Transforming trauma: a qualitative feasibility study of integrative restoration (iRest) yoga Nidra on combat-related post-traumatic stress disorder. *Int J Yoga Ther.* 2011;21:23–37.
- Taylor DJ, Mallory LJ, Lichstein KL, Durrence HH, Riedel BW, Bush AJ. Comorbidity of chronic insomnia with medical problems. *Sleep.* 2007;30:213–8.
- Werner GG, Ford BQ, Mauss IB, Schabus M, Blechert J, Wilhelm FH. High cardiac vagal control is related to better subjective and objective sleep quality. *Biol Psychol.* 2015;106:79–85.

Submit your next manuscript to BioMed Central and we will help you at every step:

- We accept pre-submission inquiries
- Our selector tool helps you to find the most relevant journal
- We provide round the clock customer support
- Convenient online submission
- Thorough peer review
- Inclusion in PubMed and all major indexing services
- Maximum visibility for your research

Submit your manuscript at
www.biomedcentral.com/submit

