

Insomnia in Geriatrics

Siti Setiati, Purwita Wijaya Laksmi

INTRODUCTION

Sleep disturbance is one of the most common symptoms we encounter in daily practice. One of those disturbances is insomnia. Insomnia can occur in all ages, but it more often happens at the age sixty-five or more. About 40 to 50 percent geriatrics experience insomnia and the prevalence in women is greater than in man.^{1,2} In a large study of community-dwelling older men and women, investigators found a 36 percent prevalence of insomnia for men and 54 percent for women. Only 26 percent of men and 21 percent of women in the study reported no difficulty with sleeping. The same study found that persons who used hypnotic medications on a regular basis were more likely to report that they did not feel rested on waking in the morning. Older persons are more likely to report difficulty getting to sleep, staying asleep, and finding sleep restorative. Family members are likely to report that the elder has difficulty in maintaining daytime alertness. Numerous studies have shown that patients institutional settings such as nursing homes and hospitals have a very high prevalence of sleep-related difficulties.³

On the other hand, there are common errors in insomnia management. The most common error in the management of insomnia is excessive use of sedative-hypnotics. Another common error is inappropriate use of long-acting hypnotics to treat older patients. This can cause morning drowsiness and may be a factor in a large number of falls and accidents.³

SLEEP PHYSIOLOGY

Sleep is not a uniform process. Sleep is divided into five stages: stage I, II, III, IV and rapid eye movement sleep (REM sleep). Each sleep stage has a unique electroencephalogram (EEG) pattern. Sleep process started from

stage I then stage II to stage IV and to the deepest sleep stage (slow wave sleep), then return to stage III and II progressing to REM sleep, which is a stage where people dream the end of one cycle. Human normally experience five to six times of those five stage cycle during the night, with one cycle duration about 90 minutes. At the first sleep cycle, most of the 90 minutes are the deep sleep (stage IV), but at the next cycles, stage IV period decreases. Almost the whole sleep stage IV is gained in the first 4 hours sleep. Therefore, even though we only sleep four to five hours a night, we have the same deep sleep with someone who sleeps as eight hours. Overall, from the whole sleep time 20 percent is a deep sleep (stage III and IV), 60 percent is a shallow sleep (stage I and II), and 20 percent is REM sleep.¹

Although there is great individual variability in sleep patterns, in general the total sleep time for elderly persons is less than that of younger adults.³ Physiologically there are sleep changes with the increasing of age (aging process), that is an increase in proportion for sleep stage I, wake frequency and sleep fragmentation all night, and decreasing proportion of sleep stage III and IV, sleep REM latent time, and sleep efficiency. It is also found there is a decrease capability in order to adapt changes in sleep-wake cycle; and sleep-wake cycle change tends to be earlier in sleep and wake time.^{1,4}

Older patients tend to wake up more during the night because of age-associated physiologic process and disease related changes. The amount of sleep needed may depend on how active the older person is during daytime hours. It appears to be an increasing tendency for older persons to be sleepless at night, to become somnolent late in the day or early evening, and to awaken early in the morning.³

INSOMNIA

Insomnia is a complaint from low quantity and/or quality of sleep for minimal three days every week in one month duration, the complaints can be difficulties to fall asleep, difficulties in maintaining sleep, awake too early with difficulties to return to sleep, and insomnia which is related to cognitive or maladaptive behavior.¹⁻⁵

Based on the duration of time, insomnia can be classified into temporary insomnia (less than one week) usually caused by acute stress, short term insomnia (more than one week, but less than 4 weeks), and chronic insomnia (more than four weeks). Insomnia can also be classified into primary insomnia and secondary insomnia. Secondary insomnia can be caused by:^{1,4}

- Psychiatric and mental disturbance
- General medical condition, such as arthritis, congestive heart failure, hyperthyroidism, or gastroesophageal reflux.
- Substance or medication, such as alcohol, beta blockers, bronchodilator, cimetidine, corticosteroids, decongestants, diuretics, levodopa or carbidopa, methyl dopa, nifedipine, serotonin selective reuptake inhibitor (SSRI), theophyllin, caffeine, or sedatives' withdrawal syndrome.
- Disordered circadian rhythms, such as in jetlag.
- Disomnia, like bad sleep hygiene; Restless Leg Syndrome (RLS, an irresistible desire to move legs, because of an unpleasant sensation, such as feeling something crawls on the legs and disappear with movement at the beginning of sleep); Periodic Limb Movement Disorder (PLMS, an unconscious habit of moving legs or hands repeatedly during sleep); and Sleep Apnea: a period of stopped breathing at sleep and ended with a moment awake.

Things that cause insomnia to the elderly are aging process itself (decreasing physiologic reserve and wake up threshold, changes in autonomic activity and circadian rhythm), environmental factor (less exposure to the sun, mostly stay at home), behavioral factor (decrease physical activity, bad sleep hygiene), psychological factor (retirement and loss of self-identity; changes in daily routines and social environment; death of a spouse, friends or family members; economic problems; bad perceptions about health and fear of death; chronic disease or terminal phase in the patient or at someone loved), nutrition factor (changes in body composition, such as an increase in body fat mass, alcohol and caffeine intake, fluid excretion system such as nocturnal polyuria) and medical factor (underlying disease, including psychiatric condition and drugs that cause insomnia).^{1,6}

Disturbances of sleep and sleep-wake rhythms are also common among patients with dementia. Impaired sleep among with Alzheimer's disease is related at least in part to the disruption of neuronal pathways that initiate and maintain sleep; more disrupted sleep is found and more arousals occur. In addition, depressive symptoms (dysthymia) are common among older persons, too. Depression is associated with frequent arousals and

early-morning awakening that may exacerbate already disrupted age-related sleep patterns.³

SLEEP DISTURBANCE EVALUATION

Patient's anamnesis must include psychosocial condition and psychiatric history besides medical condition. Questions need to be asked to the patient are about the chief sleep symptom; time onset; its influence to daily life situation; fluctuation of symptoms; the worst time and the comparison of sleep in other places; stressor identification; routine activity in patient's daily life (wake time, the way of waking, activities after awake, daily activities, day time napping habit, activities before sleep, time to go to bed, starting time to fall asleep, activities in bed before falling asleep and sleep description); alertness during the day; family history with sleep disturbance; type and amount of drugs and alcohol consumption during the day; therapy that patient's get to overcome sleep disturbance and any disturbance from partner or surrounding environment which disrupt patient's sleep. Whereas questions for sleep partner or persons who stays with the patient, are: whether the patient stop breathing while sleep; whether the patient snore; any feet movements or kicks by the patient; patient's mood; alcohol, caffeine and drugs consumption.^{1,4}

Patients are suggested to make sleep diary for one to two weeks period (minimum five days) which contains information about sleep time; things done in the bed before sleep, time started to sleep; estimation of frequency and duration of wakefulness during the night; time to wake up; time needed to get out of the bed; foods; activity pattern; drugs, alcohol, nicotine and caffeine consumption; work and social activity; exercise time and duration; day time napping time and duration.¹

Tests that can be done are polysomnography which is a sleep judgment in laboratory to know brain and muscle activity, eye movement, heart frequency and rhythm, nasal and oral airflow and oxygen saturation. Indication of this test is for permanent insomnia that has been given behavioral or pharmacological therapy, insomnia with dangerous behavior at sleep, insomnia with suspected disordered circadian rhythms, and insomnia with periodic limb movement disorder or sleep apnea.^{1,4} The management plan for insomnia in geriatrics can be seen on figure 1.⁶

THERAPY FOR INSOMNIA

Insomnia therapy consists of:^{1,2}

- Therapy for the underlying diseases in insomnia, if there is any.

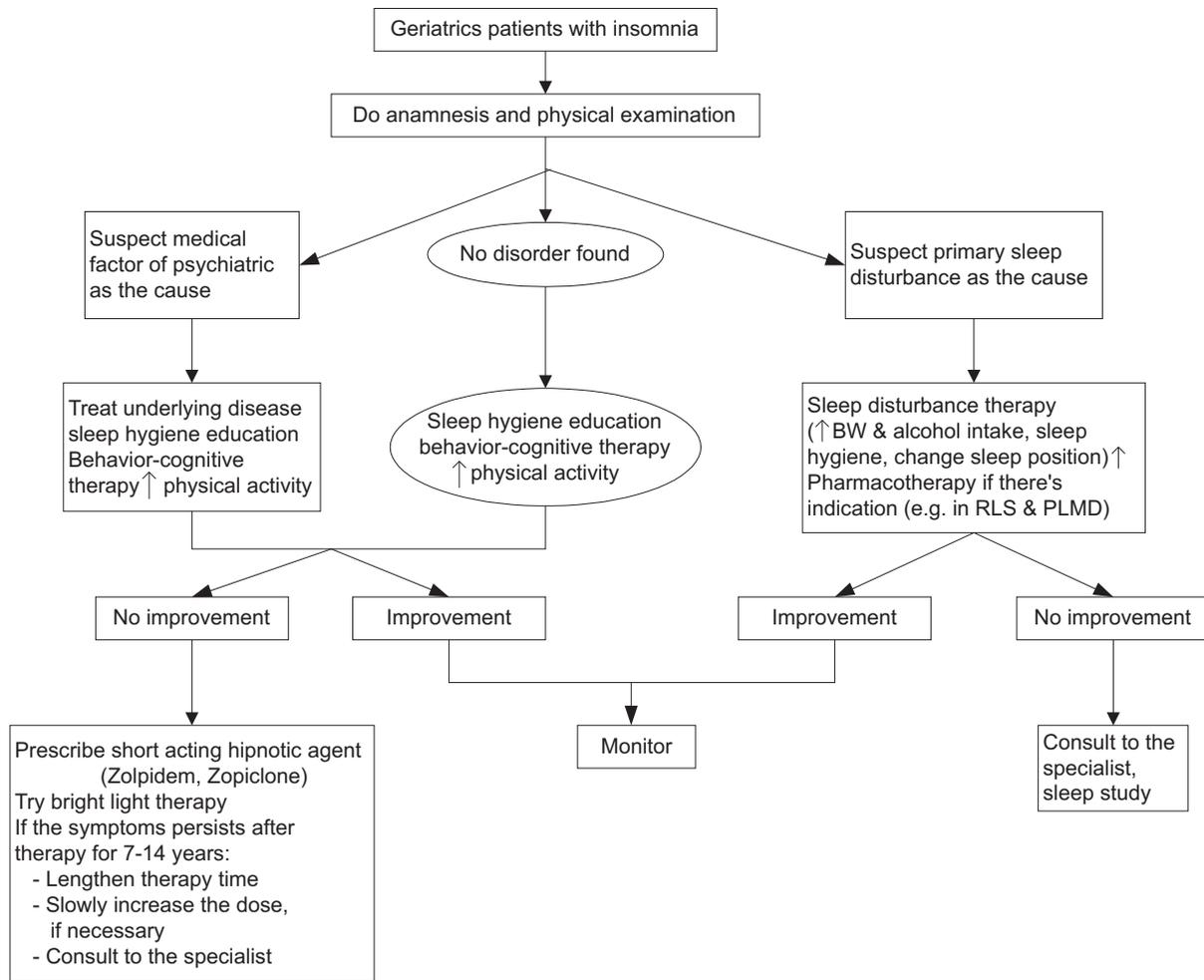


Figure 1. Management of Insomnia

- Nonpharmacologic intervention (psychotherapy, including behavior-cognitive therapy)
- Psychopharmacotherapy hypnotic medication.

If other primary condition clearly caused insomnia, it must be treated first to see whether insomnia disappeared after therapy. If there is no primary condition that can be identified or there is no change in insomnia after therapy for primary condition, nonpharmacologic and psychopharmacotherapy intervention is needed.²

Nonpharmacologic Intervention

Nonpharmacologic intervention in insomnia are educating patients for a good sleep habit (sleep hygiene) and healthy life style (diet with a balance nutrition and avoid foods or drinks that can disturb sleep; exercise; avoid drugs misuse; improve bed area like lamp position, controlling noise, temperature, etc), stimulus-control therapy and sleep restriction therapy.^{1,2}

Rules in sleep hygiene:¹⁻⁴

1. Evaluate medication effect to sleep and wake up.
2. Avoid heavy meal before sleep, it is suggested to eat small meal especially foods that contains tryptophan like milk and banana. Avoid drinks that contains alcohol, caffeine (coffee, cola and tea) and smoking (it stimulates adrenaline release) after lunch.
3. Limit fluid intake at night time to reduce nocturia.
4. Maintain a routine schedule for sleep and wake up.
5. Avoid or limit day time napping, but if necessary sleep only for thirty minutes in the afternoon so it will not disrupt night time sleep.
6. Spare some time to spend outside (without sunglasses), especially on the afternoon.
7. Exercise is recommended because it can reduce sleep onset latent phase, but not too close with sleep time (It is better to do it four to eight hours before sleep).
8. Create a good and comfortable sleep environment (good ventilation, not too hot or cold, no noise, dim lightning, soft bed, not directly facing with clock and undisturbed by clock's tickling).

Table 1. The Most Common Medication Prescribed for Insomnia Therapy⁷

Medication (Trade Name)	Therapeutic dose (mg/day)		Time until Onset of Action (minutes)	Elimination Half Life (hour)	Active Metabolite
	Adult	Geriatric			
Clonazepam (Klonopin) #	0.5-2	0.25-1	20-60	19-60	No
Clorazepate (Tranxene)	3.75-15	3.75-7.5	30-60	6-8	Yes
Estazolam (Esigal)	1-2	0.5-1	15-30	48-96 ψ	No
Lorazepam (Ativan) #	1-4	0.25-1	30-60	8-24	No
Oxazepam (Serax)	15-30	10-15	30-60	2.8-5.7	No
Quazepam (Doral)	7.5-15	7.5	20-45	15-40	Yes
Temazepam (Restoril)	15-30	7.5-15	45-60	39-120 ψ	No
Triazolam (Halcion)	0.125-0.25	0.125	15-30	3-25	No
Chloral hydrate (Noctec) \mathcal{D}	500-2000	500-2000	30-60	1.5-5	Yes
Haloperidol (Haldol) # \mathcal{D}	0.5-5	0.25-2	60	4-8	Yes
Trazodone (Desyrel) # \mathcal{D}	50-150	25-100	30-60	20	No
Zolpidem (Stilnox) \mathcal{D}	5-10	5	30	5-9	No
				1.5-4.5	No

Notes:

Use of this drug as a hypnotic agent is not approved by the FDA (Food and Drug Administration)

 ψ The values applies as an active metabolite \mathcal{D} These drugs are not benzodiazepines**Instruction in stimulus-control therapy:**¹⁻⁴

1. Use bedroom only for sleep and sexual activities, not for reading, watching television, eating, or working.
2. Go to bed only when sleepy. If patients unable to sleep after 20 minutes, get out of bed and go into another room and do relaxing things, such as listening to the music. Avoid watching televisions because television radiates bright light and therefore has an arousing effect. Whenever feel sleepy, go to bed, but if in 20 minutes on the bed patient unable to sleep, do things that has been mention above repeatedly until fall asleep. This step aim to reestablish psychological connection between bedroom and sleep, not on the contrary bedroom and insomnia.
3. In the morning, wake up at the same time each day regardless of how much they slept during the previous night (variation only allowed no more than 1 hour). This can restore sleep-wake schedule (time control) and increase sleep efficiency.
4. Day time napping should be avoided.

Sleep Limitation¹⁻⁴

According to the sleep diary, total count sleep time each night and percentage of total sleep time divided total time spent in the bed (sleep efficiency).

Sleep limitation is done by adjusting the total time spend in the bed with the total real sleep time. For example: one patient usually wakes up at 6 am and the average sleep time is about 5 hours in one night, while the average time he spends his time on the bed is about 8-9 hours. For this patient, he is only allowed in the

bedroom from 00.45 am and must wake up at the same time in the next day. After that, if the patient's sleep time efficient (sleep efficiency in five nights continuously achieved 80-85%) he can increase fifteen minutes before sleep time every week, or reduced fifteen minutes if not efficient. This procedure is continued until patient can sleep for 8 hours or achieve a good night sleep. Patient is not allowed to have day time napping. This can cause patient feel sleepy in the afternoon at the first few weeks of sleep limitation program.

Relaxation Techniques³

It may be helpful for person with psychophysiologic insomnia. Thoughts should focus on pleasant images or a simple objects. Patients should be instructed to first tense all the muscles in the body and beginning with their feet consciously relax the main muscle groups moving toward the head and neck. The interventions used included a drink of warm milk, a gentle massage, and soothing music.

Psychopharmacotherapy

If there is no improvement from insomnia after a good and correct psychotherapy, then hypnotic medication should be given. But earlier hypnotic medication can be prescribed if insomnia is caused by deep stress (like loosing job or sadness) or in a pain or there is a disability caused by lack of sleep. Earlier hypnotic medication must be accompanied by psychotherapy. The most common medication for insomnia therapy can be seen on table 1.^{1,7}

Principles for prescribing hypnotic medications are: use

the lowest effective dose, use intermittent dosage (two to four times weekly), prescribe medication for short time use only (no more than three to four weeks), discontinue medication gradually, and be alert for rebound insomnia because of discontinuation of drugs. In addition, it is preferable to use shorter life time elimination agent to reduce day time sedation and consider patient's condition such as renal and hepatic insufficiency, and sleep apnea (which is a contraindication to prescribe sedative or hypnotic agents).^{4,7} Medication to be avoided in the treatment of persons with insomnia are diphenhydramine hydrochloride, chloral hydrate, alprazolam, diazepam, and flurazepam.³

Insomnia treatment using antihistamines or alcohol should be avoided. Even though those agents can accelerate the onset of sleep, but it can affect sleep quality because it changes sleep pattern and causes sleep fragmentation, lessens the deep sleep and waking up more often, so it can interfere the next day's appearance.⁷ Antihistamines should be avoided in the management of insomnia, especially among older men, because of their anticholinergic effects and the potential for causing urinary retention, postural hypotension, and confusion.³

Barbiturates are rarely used now because there is bigger toleration risks, addiction, and death because of overdose compared to benzodiazepine. Chloral hydrate and Chlormetiazol are also rarely used now.⁷ Chloral hydrate is rapidly metabolized to its active form, trichloroethanol. The potential for gastrointestinal side effects, interaction with protein-bound medications, and morning hangover among some patients suggests that this agent be avoided by older patients.³

Antidepressants, melatonin, benzodiazepine, and zolpidem are an effective medication for insomnia therapy. Selective serotonin receptor inhibitors (SSRI) and serotonin-specific, which has fewer side effects than aminotricyclic can be given for, sleep disturbance in depressed patients. However, the benefit of using low dose aminotricyclic of SSRI in insomnia without depression is unclear.⁷ Other medications that may be considered are nortriptyline, doxepin, and trazodone. Many patients with dementia experience insomnia due to increased agitation at night. This may be reduced with an evening dose of an anxiolytic medication or risperidone. Melatonin, which is secreted by the pineal gland at night, may be important in the regulation of sleep but has been demonstrated to decrease with age. Many patients take melatonin (in doses up to 3 mg) to help them sleep. Improved induction, maintenance, and quality of sleep have been reported among older patients.³

According to twenty-three randomized and double-blind clinical trial, the effective psychopharmacotherapy

for chronic insomnia in geriatric in a short term are zolpidem and some benzodiazepines (such as triazolam, temazepam, flurazepam, and quazepam). In addition, Food and Drug Administration prohibited the use of hypnotic benzodiazepine more than 4 weeks because of the effectiveness of long term hypnotic medication for sleep disturbance is still questionable and there is a dependence risk too.⁷

Benzodiazepine and zolpidem work as hypnotic agent through modulation activity to receptor complex γ -aminobutyric acid (GABA), and that causes them have the same side effect, such as: memory disturbance; falling; overly sleepy; accident, which usually happens at the high dose regiments or there are accumulations from the active metabolite; and dependence risk. But compared to benzodiazepine, zolpidem gives lesser psychomotor, cognitive, and sleep pattern disturbance, or withdrawal syndrome as a side effect.⁷⁻⁸

Benzodiazepines can cause toxicity, tolerance, and physical and psychological dependency, especially among elderly patients. Chronic use of benzodiazepines may cause habitation, loss of efficacy, tolerance, and drug-induced insomnia. Although short-acting agents may cause rebound insomnia, impaired psychomotor performance, and unusual behavioral effects, it is still preferable to use short acting benzodiazepines, such as temazepam. Benzodiazepines with long half-lives, such as diazepam and flurazepam (48 and 72 hours, respectively), are likely to worsen undiagnosed sleep apnea syndrome and sleep problems caused by depression. There is evidence that regular use of long-acting sedative-hypnotic medications is associated with adverse daytime effects, such as impair cognition, impaired psychomotor functioning. Triazolam can be considered, but both triazolam and alprazolam have been reported to induce transient global amnesia. Alprazolam is also not recommended as a hypnotic because of the likelihood of dependency, tolerance, and risk of withdrawal among older persons.³

Zolpidem appears to be generally well tolerated by older patients. Zolpidem rapidly absorbed after oral dose, with maximal plasma concentration reached in 2 hours after single 10 mg therapeutic dose. Primary metabolic route included oxidation and hydroxylation, and there is no pharmacologically active metabolite. Zolpidem decreases latent phase sleep stage II and frequency and duration of waking up from sleep, but also increasing total sleep time. Thus zolpidem can improve sleep quality without disturbing patient's psychomotor appearance in the morning after the medication given, less toleration effect in the long term, or rebound insomnia if the medication stopped. Side effects, which

probably happen, are dizziness, somnolence, headache, and gastrointestinal problem. In 10 mg dose, there is no effect to anterograde memory.^{3,8,9} Zolpidem 5 mg should be considered as a first pharmacological agent, increasing to a maximum dose of 10 mg if necessary.³

Sleep Apnea

Sleep apnea therapy includes behavioral, pharmacological, and surgical therapy. Patients are encouraged to lose weight, avoid alcohol and sedative agents, change sleep position, and avoid condition that cause lack of sleep. The first line medical treatment is the use of continuous positive airway pressure (CPAP) by wearing a tight-fitting nasal mask. Humidification and warming of air administered with CPAP can reduce nasal drying and irritation. The second line medical treatment is the use of oral appliances. Patients can also be given fluoxetine or protriptyline, thyroid hormone for hypothyroid patients, and oxygen administration at night. Surgical intervention, such as widening the upper airway, often eliminates snoring. The procedure may ameliorate apnea and improve daytime alertness and functioning; it could be tracheostomy, uvulopalatopharyngoplasty, genioglossal advancement, or maxillomandibular advancement procedure.^{1,3}

RLS and PLMD

RLS and PLMD sleep disorder can be treated with levodopa and/or carbidopa agents, pergolide, or clonazepam.^{1,3} Carbidopa-levodopa (25/100-mg formulation) may be started in a dose of one-half tablet before bedtime. The dose can be increased in increments of one-half tablet every 3 or 4 days to a maximum of two tablets per day. Pergolide can be started at doses of 0.05 mg and gradually increasing to 0.5 mg.³

Sleep-Wake Disorder

Sleep-wake disorder therapy includes education of good sleep habits, chronotherapy, and phototherapy.¹

Chronotherapy for late sleep pattern is conducted by posing the patients in 27 hours per day and delaying patient's usual sleep onset, progressively for approximately 3 hours every sleep-wake period. Every sleep period was limited for 7-8 hours and daytime napping is not allowed. This condition is continue to be done until the patient's sleep onset is suitable to proper bed time according to the patient. Chronotherapy for advance sleep pattern is conducted by going to sleep 3 hours earlier every night until the sleep cycle returns to normal bedtime.¹

Phototherapy is conducted by manipulating darkness and brightness of the light since our circadian rhythm is affected by dark and bright. When someone has difficulty to sleep, we darkened the circumstances, but when someone has difficulty to wake up, we make sunshine goes through the bedroom every morning.¹

For shift worker, try regular sleep and eat schedule, daytime napping to prevent loss of sleep and avoid disturbance (sound, etc) during sleeping, perform good sleeping habits, change the work shift every certain period, and avoid prolong work shift.¹

Sleep disorder, which is caused by jet lag, is more prominent in advance cycle (going west to east) compare to late cycle (going east to west). Things that can be done: when boarding in an airplane, the time setting is changed according to the destination time and try to sleep according to the destination bed time, make sleep-wake cycle as soon as possible when we arrive. Exposure to bright light in the morning, such as walking for one hour under sunshine in the morning, can help fastened to fit in the circadian rhythm.¹

REFERENCES

1. Management of mental disorders. In: WHO collaborating center of mental health and substance abuse. 2nd ed. Sydney: Wild and wooley Pty Ltd; 1997. p. 600-34.
2. Cohen-Zion M, Ancoli-Israel S. Sleep disorders. In: Hazzard WR, Blass JP, Ettinger WH, Halter JB, Ouslander JG, eds. Principles of geriatric medicine and gerontology. 4th ed. New York: McGraw-Hill Health Professions Division; 1999. p.1531-41.
3. Coll PP. Sleep disorders. In: Adelman AM, Daily MO. 20 common problems geriatrics. Singapore: McGraw-Hill Book Co; 2001.
4. Gooneratne N. Insomnia. In: Forcica MA, Schwat EP, Raziano DBY, Mourey RL, eds. Geriatric secrets. 3rd ed. Philadelphia: Hanley&Belfus; 2004.
5. Ringdahl EN, Pereira SL, Delzell JE. Treatment of primary insomnia. J Am Board Fam Pract. 2004;17:212-9.
6. Schneider DL. Insomnia: safe and effective therapy for sleep problems in the older patients. Geriatrics. 2002;57:24-35.
7. Kupfer DJ, Reynold CF. Management of insomnia. N Engl J Med. 1997;336:341-6.
8. Monti JM. Primary and secondary insomnia: prevalence, causes and current therapeutics. Curr Med Chem-Central Nervous System Agents. 2004;4:119-37.
9. Perlis ML, McCall WV, Krystal AD, Walsh JK. Long-term, non-nightly administration of zolpidem in the treatment of patients with primary insomnia. J Clin Psychiatry. 2004;65: 1128-37.