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IJIRR
International Journal of Information Research and Review
Vol. 05, Issue, 05, pp.5511-5513, May, 2018

REVIEW ARTICLE

CLINICAL OUTCOMES OF THE ISCHEMIC STROKE PATIENTS WITH HYPERSOMNIA

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ARTICLE INFO

Article History:

Received 27th February, 2018
Received in revised form
20th March, 2018
Accepted 18th April, 2018
Published online 30th May, 2018

Keywords:

Ischemic stroke,
Hypersomnia,
NIHSS,
Clinical outcomes.

ABSTRACT

Objectives: to analyze clinical outcomes of the ischemic stroke patients with hypersomnia using The National Institutes of Health Stroke Scale (NIHSS) score transformation.
Design: observational analytic study with longitudinal cohort approach
Setting: the study was conducted at Dr. Wahidin Sudirohusodo General Hospital, Hasanuddin University Teaching Hospital in Makassar, Indonesia.
Procedure: 72 subjects diagnosed with ischemic stroke, divided into two groups by using Sleep Diary Test. One group with hypersomnia while other without hypersomnia.
Results: The mean rank ΔNIHSS score of ischemic stroke patientswere 47.88 (hypersomnia)vs 29.26 (non hypersomnia) showed significant difference between those 2 groups (p= 0.000;Mann-Whitney Test). The changed of NIHSS score in ischemic stroke patient, mean rank was 45.93 (hypersomnia) vs 30.50 (non hypersomnia) Significantly showed ischemic stroke patients with hypersomnia group had worse clinical outcomes (p = 0.002; Mann-Whitney Test).Hypersomnia in ischemic stroke patients were affected by left hemisphere lesion (p = 0.026), and basal ganglia lesions (p = 0.009).
Conclusion: The clinical outcomes of ischemic stroke patients with hypersomnia worse than patients without hypersomnia based on NIHSS score transformation.

INTRODUCTION

Stroke occurs in 16.9 million people worldwide and is the second leading cause of death. Most stroke occurs in low- and middle-income countries with an incidence rate of about 69% of all stroke events. Every year, about 610,000 people in the United States suffer the first attack stroke and about 185,000 people with recurrent stroke (Benjamin *et al.,* 2017).Stroke is a major healthcare problem in South, East, and South-east Asia, with majority population living in the developing countries such as Indonesia. Asian countries have a population of about 66% of the world's population and account for nearly 70% of global stroke cases (Mehndiratta *et al.,* 2015).In Asia, ischemic stroke occurs more than hemorrhagic stroke, except in India and Vietnam, where the converse is observed (Venketasubramanian *et al.,* 2017).Sleep disorders are quite common reported in ischemic stroke patient. Prevalence of sleep disorders inischemic stroke varies from 20-63%, including hypersomnia, insomnia, parasomnia, Periodic Limb Movements in Sleep (PLMS) and Sleep Related Breathing Disorders. The presence of this sleep disorder may affect the mortality rate and prognosis of the patient (Bollua *et al.,* 2016). Hypersomnia (excessive daytime sleepiness) occurs in 27% of stroke patients and frequently sequele and 5% of those become persistent (Jang *et al.,* 2016). Hypersomnia related neurological disorders such as in ischemic stroke patient had not been treated with special consideration, probably due to the theory: sleep is normal evolutionary response and vitally important for helping both people and animals recover during sickness. It is part of restorative, conservative, and adaptive response of the healing process (Consens, 2016).Decreased activity in the cell of nervous system that promote weak fullness happened during sickness is related with FLP-13 neuropeptides released by the sleep-promoting ALA neuro bind to the DMSR-1 receptor on the surface of wake (Davis and Raizen, 2016).On the contrary, several researches showed high mortality rate was associated with short sleep duration or long sleep duration, as indicated by U-shaped curves. The American Academy of Sleep Medicine consensus announced that sleeping over 9 hours per day in adults increase mortality rates in people without risk factors. Some studies said that the

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duration of sleep more than 9 hours will increase cardiovascular risk (Jang *et al.,* 2016). It caused 30% higher risk of death than control (Cappucio *et al.,* 2011).Previous research by Shen *et al.* (2016), revealed six theories underlie the mortality risk in people with long sleep duration, which are (i) an increase in the number of sleeps associated with an increase in the amount of sleep fragmentation that negatively affected health, (ii) lethargy after sleep could lead to decreased resistance to stress and disease, (iii) changes in cytokine levels associated with an increased risk of mortality, (iv) people with long sleep duration have short photoperiods associated with increased mortality in mammalian species; physiological challenges lead to a decline in longevity, (vi) long-term sleep-mediating disease processes (Shen *et al.,* 2016). The opposite statement above became our main basis of interest. Studies about relationship between hypersomnia and clinical outcomes rarely found. There has been no study related to ischemic stroke patients with hypersomnia and clinical outcomes in Indonesia. Based on this background, we also analyze changes in NIHSS score of ischemic stroke patients with hypersomnia related to the location of the lesion in left or right hemisphere, thalamus lesions, basal ganglia, internal capsules, and extensive lesions.

MATERIALS AND METHODS

This is an observational analytic study using a longitudinal cohort approach. It was carried out in Dr. Wahid in Sudirohusodo General Hospital as Hasanuddin University Teaching Hospitalin Makassar, Indonesia from April 2017 – December 2017. The data were collected with history taking and physical examination (general and neurology) to obtain information related to acute stroke (1st attack) and we did non contrast Head CT scan to confirm the diagnosis of ischemic stroke (head CT scan showed infarction).Chest x-ray, electrocardiography, and laboratory examination (whole blood and blood chemistry) test were obtained to exclude patients with heart disease, pulmonary disease, liver and / or kidney disease, and electrolyte disturbance. We also excluded subjects with sleep disorders history, previous consumption of sedation or muscle relax an drugs, mental disorders, late workout physical exercise 30 minutes to 1 hour before going to bed at night, had fever and /or seizure with any caused. Sleep Diary Test were used to record sleep duration for 7 concecutive days, then subjects would be categorized as hypersomnia group if the sleep duration ≥10 hours/day for at least 3 consecutive day and there was no lack of sleep the previous night. It was conducted by patient's family at 8am (morning form) and 8pm (evening form) based filling instruction and cross check done every 10am by researchers. Clinical outcome was assessed twice: 1st day of admission and 7th day of hospitalization using The National Institutes of Health Stroke Scale (NIHSS).

RESULTS AND DISCUSSION

Participants demographic: This study included 72 subjects (30 males/42 females), consisted of 28 subjects acute ischemic stroke patient with hypersomnia and 44 subject without hypersomnia. Mean age recorded 53.68 ± 7,089 years with the age range from 43 to 66 years. Median score of NIHSS 1st day assessed showed total of 19 sore equal between ischemic stroke patients with hypersomnia and without hypersomnia group. While median NIHSS score for last day (7th day hospitalization) showed hypersomnia group 16.5 and without hypersomnia 15.5. Ischemic stroke patients with hypersomnia group showed bigger median score of NIHSS, that indicated heavier strokes degrees and worse clinical outcomes. The research obtained mean rank of ΔNIHSS score (1st and 7th daycare) were 45.68 (hypersomnia) vs 29.26 (non hypersomnia) with p value= 0.000 (Mann-Whitney Test). It was also showed significant difference between those 2 groups. Table 1 showed the change of NIHSS score of ischemic stroke patient, mean rank were 45.93 (hypersomnia) vs 30.50 (non hypersomnia)p = 0.002 ((Mann-Whitney Test). It showed that ischemic stroke patients with hypersomnia group had worse clinical outcomes. Normally, a person sleeps through 4 to 6 sleep cycles, alternating between REM and non-REM (Mayo Clinics, 2016). Increased sleep duration on hypersomnia (over 10 hours per day) would improve both REM and non-REM sleep. Petit *et al.* (2015) found that REM sleep had metabolic consequences such as increasing metabolic rate and higher utilization of glucose during sleep. Using too much glucose accompanied with increasing metabolism rate induce lack of glucose that required for body / brain cells on healing process (Petit *et al.,* 2015).

Table 1.The changes of NIHSS score of ischemic stroke patients

Group	n	mean rank	p value
Hypersomnia	28	45.93	
Non Hypersomnia	44	30.50	0.002

It seem may cause poor clinical outcome in ischemic stroke patient with hypersomnia. Nerve oscillation patterns during sleep observed by Abel *et al.* showed stimulation during neurobiological processes related to synaptic plasticity and long-term potentiation. The statement can be analogized that synaptic plasticity were affected by sleep, so sleep disturbance may cause disrupted of plasticity process. Whereas in conditions with ischemic stroke, brain damage due to infarction, required better synaptic plasticity forsupporting patient's clinical improvement (Abel *et al.,* 2015).The worse outcomes of ischemic stroke patients with hypersomnia comparenon hypersomnia may be related to the cytokine levels in the patient's blood. Increasing cytokine production has been documented in the brain during acute ischemic stroke. Liu *et al.* (1999) and Hurn *et al.* (2007) has shown that cytokines can also be produced by surrounding brain cells after ischemia including glial cells (Kim *et al.,* 2014). Some of the well known cytokine scan cause NREM increase, they are IL-1, IL-2, IL-8, IL-15, IL-18, epidermal growth factor, erythropoietin, nerve growth factor, brain derived neurotrophic factor, glial - derived neurotrophic factor neurotrophins3, interferon gamma, tumor necrosis factor beta, ranulocyte-macrophage colony-stimulating factor. (Krueger, 2008). Interleukin-1 is a neurotoxic mediator, still increasing after ischaemia. Yamasaki *et al.* (1995) and Boutin H *et al.* (2001) shown IL-1 worsened clinical outcomes and increased mortality (Kim *et al.,* 2014).
Based on table 2 below, it showed group of ischemic stroke patients with hypersomnia where infarct located in basal ganglia, based statistic measure significantly had worse clinical outcomes (p=0.026, Mann-Whitney Test). The mean rank were 21.95 (hypersomnia) vs 8.00 (non hypersomnia).Such conditions may be explained by Geraschenko D *et al.* (2006), Qiu *et al.* (2010), and Vetrivelan R *et al.* (2010). Lesions in Caudate Putamen (CPu), Nucleus accumbens (NAc), and external ganglia basalis (GPe) in mice showed increasing of NREM and NREM stage sleep waves in the cortex electroencephalogram (EEG). This mechanism is related to GABA affecting the inferior GPe which inhibits the pramidal cells, which in turn promotes sleep and increasing number of

sleep (Lazarus *et al.,* 2013). Tabel 3 below, showed ischemic stroke patien with hypersomnia where infarct located in left hemisphere statistically significant (p=0.026, Mann-Whitney Test) had worse clinical outcomes. The mean rank were 21.95 (hypersomnia) vs 8.00 (non hypersomnia). Our findings analogous with Castaigne P and Escourolle R (1967) results. Left hemisphere lesions are more likely to cause hypersomnia in ischemic stroke patients.[4]The condition is supported by Fere, Ribo, Rodriguez-Luna (2013), they found that right hemispheric stroke lesions caused more insomnia symptoms than the left hemisphere (Fere *et al.,* 2013).

Table 2. Relationship between infarct lesion and NIHSS score changes in ischemic stroke patients

Lesion	n	Mean rank NIHSS change	p value
Thalamus			
Hypersomnia	8	7.50	1.00
Non Hypersomnia	6	7.50	
Internal capsule			
Hypersomnia	6	19.08	0.45
Non Hypersomnia	26	15.90	
Basal ganglia			
Hypersomnia	5	15.60	0.009
NonHypersomnia	9	8.00	
Broad lesions (≥ 2lobes)			
Hypersomnia	9	6.89	0.51
Non Hypersomnia	3	5.33	

Table 3. Relationship between hemisphere location of infarctand NIHSS score changes in ischemic stroke patients

Lesion	n	Mean rank NIHSS change	p value
Left hemisphere			
Hypersomnia	10	21.95	0.026
NonHypersomnia	22	14.02	
Right hemisphere			
Hypersomnia	18	24.42	0.055
NonHypersomnia	22	17.30	

The occurrence of insomnia under these conditions is due to the influence of the thalamus, and the brainstem, especially the thalamoencephalic region of the pontomesencephalic region, and / or the pontine tegmentum which causes reversal of the sleep and waking cycle of the night (Fere *et al.,* 2013). The insomnia incidence is approximately 18.1% of ischemic stroke patients (Leppavuori *et al.,* 2012).In line with Penazola *et al.* (1964), Stermandan Clemente (1962) found experimentally that the rat cortex area is very influential on sleep stimulation. Villablanca and Marcus (1972) found neocortical lesions and striatum associated with insomnia. Different theory suggested by Vock *et al.* (2002), they subscribe mild hemispheric stroke lesions are consistent with the onset of insomnia, not based on differences in left or right hemisphere lesions (Vock *et al.* 2012).But in our study, we did not observed the lesion size.

Conclusion

This study implies that short-term clinical outcome of ischemic stroke patients with hypersomnia is worse than ischemic stroke patients without hypersomnia based on NIHSS score changes. Also patient with left hemisphere lession or with basal ganglia lession implies worse outcome.

Recommendation: Active screening and particular attention for hypersomnia condition after ischemic stroke are important, especially patients with left hemisphere lesions and / or with basal ganglia lesions. As hypersomnia (over 10 hours per day) associated with worse short-term clinical outcomes in ischemic stroke patients.

Acknowledgement: The author wish to thank the Head of Dr. Wahidhin Sudirohusodo General Hospital and Principal for providing the infrastructure facilities in Neurology Department Medical Faculty of Hasanuddin University, Indonesia.

REFERENCES

Benjamin EJ, Blaha MJ, andChiuve SE. Heart Disease and Stroke Satistics 2017 update : a report from the American Heart Association. *Circulation Journal,* 2017

Mehndiratta P, Wasay M, Mehndiratta MM. 2015. Implications of Female Sex on Stroke Risk Factors, Care, Outcome and Rehabilitation: An Asian Perspective. *Cerebrovasc journal,*2015; 39:302-308.

Venketasubramanian N, Yoon BW, and Pandian J. Stroke Epidemiology in South, East, and South-East Asia : A Review. *Journal of Stroke,*2017;19(3):286-294.

Bollua CP, Pandeya A, Pesalaa SP, and Nalleballe. Sleepiness after Stroke : Case Report and Review of Literature on Hypersomnia as a Result of Stroke. *Madridge Journal of Neuroscience*, 2016; 1(1):1-3

Jang SH, Lee HD, Chang CH, and Jang YJ. Recovery of Hypersomnia Concurrent with Recovery of an Injured Ascending Reticular Activating System in a Stroke Patient. *Medicine Journal,*2016; 95(2).

Consens FB.A Text Book of Sleep in Medical and Neurologic Disorders, an Issue of Sleep Medicine Clinics. Volume 11 Number 1. *Philadelphia. Elsevier Inc.,* 2016: pp.39-52

Davis KC and Raizen DM. Mechanism for sickness sleep : lessons from intervertebrates. *The journal of physiology,*2016.

Cappucio FP, D'Elia L, Strazzullo P, and Miller MA.Sleep Duration and All-cause Mortality : A systematic Review and Meta-Analysis of Prospective Studies. *Sleep journal,* 201;.33(5):685-592.

Shen X, Wu Y, Zhang D. Nighttime sleep duration, 24-hour sleep duration and risk of all-cause mortality among adults : a meta-analysis of prospective cohort studies. *Nature Journal.*2016

Mayo Clinics. Test and ProceduresPolysomnography (sleep study). *Sleep Journal,*2016.

Petit JM, Godinot SB, Magistretti PJ, and Allaman I. Glycogen metabolism and the homeostatic regulation of sleep. *Metabolic Brain Disease Journal,*2015; 30(1).

Abel T, Havekes R, Saletin JM, and Walker P. Sleep, plasticity and memory from molecules to whole brain networks. *Current Biology Journal,*2015; 23(17):788-2013.

Kim JY, Kawabori M, and Yenari MA. Innate Inflammatory responses in stroke : mechanism and potential therapeutic targets. *Curr Med Chem,*2014; 21(18):2076-2097.

Lazarus M, Chen JF, Urade Y, and Huang ZL. Role of the ganglia in the control of sleep and wakefulness. *Curr Opin Neurobiol,*2013; 23(5):780—785.

Fere A, Ribo M, and Rodriguez-Luna S.Strokes and their relationship with sleep and sleep disorders. *Neurologia Journal,*2013; 28(2):103-18

Leppavuori A, Pohjasvaara T, Vataja R, andKaste M, Erkinjuntti T. Insomnia in ischemic stroke patients. *Cerebrovasc Dis,*2012;14(2):90-7

Vock *et al.* Evolution of sleep and sleep EEG after hemispheric stroke. *Journal of Sleep Journal,*2002; 11: 331-338.

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