Effectiveness of Warm and Cold Water to Reduce Insomnia Level in Elderly

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Abstract: Insomnia or sleeping difficulty is one of the problems that are often experienced by the elderly. It reduces the sleep hours and put them into more vulnerable condition such as fatigue and dizziness. During observations in caring an elderly family, elderly struggled to overcome the difficulty to sleep. Based on the experiences the authors are interested to find out whether warm and cold water effective to reduce insomnia level in elderly. A quasi-experiment with pre-test and post-test design was employed to examine the effectiveness of both interventions. Test was administered to the study before and after the 11 days of intervention using insomnia rating scale. Data were analyzed by using a paired t test to compare the sig. values for both interventions. Result shows that insomnia levels decreased from moderate to mild level after warm and cold hydrotherapy as well after warm hydrotherapy. Sig. values for both interventions is <0.05. Moreover Sig. values indicate that combination of warm and cold water is slightly more effective than warm water alone. Although the sample of this study is limited, therapies proved its own effectiveness. Therefore, both of them are worthy to be used by healthcare providers in handling elderly with insomnia.

Key words: Insomnia, Hydrotherapy, Elderly

Introduction

Elderly people become more prone to several health problems due to decrease of physical and physiological functions. One of the biggest issues of health problem in elderly is insomnia. Insomnia is a condition when the elderly experiences difficulty to have a soundly sleep. In simple way, insomnia can be defined as difficulty initiating sleep, or difficulty maintaining sleep, early morning awakening, short sleep, or non-restful sleep. Any female or male can be affected. Normal sleeping hour for adult is seven to nine hours. It slightly decreases to seven to eight hours for elderly. People who suffer from insomnia sleep less than four hours.

Approximately sleep problems occur in over 50% of adults worldwide. The prevalence is increased in older adults compared with younger individuals. The numbers of people who suffer from insomnia remain high in different countries. For example, in United State it has been declared that each night millions of people in the United State struggle to fall asleep. Roughly 60 million are affected by the sleep disorder each year. Between 40% and 60% of them are age over 60 years old. In England the prevalence of insomnia steady increase from 35.0% to 38.6% during 1993-2007. It is also happen in Australia. Over 1.2 million of the populations experience sleep disorders. Other countries are almost similar (National Public Radio (NPR), 2008; Chiropractors Association of Australia, 2008; Neikrug, & Ancoli-Israel, 2010; Calem et al., 2012; Heffron, 2014; Medscape, 2017).

Insomnia is classified in two classes as acute (less than or four weeks) and chronic (more than four week) depending upon the duration. Acute insomnia often associated with acute illness, acute or recurring psychosocial stressor, hospitalization, jet lag, or changes in sleeping environment (Kamel & Gammack, 2006). Chronic insomnia is divided into primary and secondary insomnia. Primary insomnia includes sleep-disordered breathing (SDB)/sleep apnea, restless leg syndrome
(RLS)/periodic limb movement disorder, and circadian dysfunction (Ancoli-Israel, 2005). Secondary insomnia arises out of underlying medical or psychiatric illness/disorders or adverse effect of drugs/medication effects. Older adults tend to suffer from both primary and secondary insomnia (Schneider, 2002; McCall, 2004; Krishnan & Hawranik, 2008).

Although insomnia is not a disease or life threatening condition, the consequences result in morbidity and mortality. Some people may experience the mild impacts but most of chronic insomnia causes a severe and ongoing struggle. Negative impacts of sleep insufficiency destruct the whole dimensions (physical, psychological, socioeconomic) of life of the elderly and lead to lower quality of life.

Physically, Insomnia can leads into reduction of muscle strength, low energy and fatigue. As a result, elderly experiences imbalance and ambulatory problem. In some they have higher risk for fall. Insomnia also increased destruction of vital organ, and heightened sensitivity to pain. In severe condition it disrupts insulin production and sugar metabolism and perhaps increasing risk of diabetes. Most importantly it is weakened immune system and lower defenses against illness. Moreover older adult with sleeping difficulties report decreased quality of life and endorse more symptoms of depression and anxiety. Latest research declared that insomnia and depression share common pathological processes. Insomnia also put the elderly response slower, and some suffer from more cognitive dysfunction such as poor and impaired memory. Lack of concentration can lead into accident such as leave the stove on and the door unlock. It is reported that in some cases elderly have mood disturbance, inability to focus and low motivation particularly in self-care (Roth, 2007; Heffron, 2014; Rodrigues 2015; Insomnia.net, 2017).

Insomnia also results in socioeconomic dimension. Insomnia may raise direct and indirect cost. Direct cost for insomnia included to buy products such as more comfortable bedding, alarm clock, ear plugs and eyes pads, sleep aromatherapy, sleep music and many more. In addition, a big amount of money was paid to buy sleep-related medications whether it is prescribed or over the counter. Business products such as technical equipment are advanced and promoted to help to reduce insomnia and the price is high. Cost also include for consultations, treatments and natural supplements. More over people who suffer from insomnia often use alternative remedies that can cost more money. Indirect cost emerged to pay fall-related treatment such as hospitalization and surgery (McCall, 2004; Insomnia.net, 2017). Insomnia reduces social function and increase role limitation (Roth, 2007).

Whatever the causes or the consequences, the treatment should be done earlier and focused toward the goal of getting restful sleep. Before selecting the best interventions to help elderly cope with sleep disturbance, health care provider need to perform assessment comprehensively. In doing so, one will be able to formulate nursing diagnose accurately. Accurate nursing diagnose will lead appropriate interventions that suitable for each elderly. Many evidence have been raised how to help the elderly people using pharmacological and non-pharmacological. There are several strategies had been published and can be picked up and implemented to solve the sleep problem among the elderly. Health care provider is encouraged to use non-pharmacological intervention more often rather than pharmacological. The main goal is to avoid toxicity and reverse effect of the medication in which elderly is less tolerated.

The first non-pharmacology that can be used to combat insomnia is using stimulus control. The goal of this intervention is to improve healthy sleep habits through re-association such as using bedroom for sleep and directly go to bed when sleepy. When elderly unable to sleep after 20 minutes, they should be allowed to leave the bed and engaged in relaxing activities until drowsy and then return to bed. It is also suggested to maintain regular morning rise. Short napping should be limited to 30 minutes early afternoon rather than late afternoon (Bootzin & Epstein, 2000)

Secondly, sleep hygiene education is used to acknowledge the elderly about the importance of healthy behavior that promote restful sleep. The strategies involve a regular low-impact exercise such as stretching is good before 3-4 hours prior to sleep. Encourage the elderly to set and maintain a regular sleep pattern each day. Let the elderly know the importance of darken the room, setting the temperature not to hot or too cold, and avoid noises as much as possible. Elderly should be informed not to take tobacco, stimulant, caffeine, and alcohol 4-6 hour before sleep. Excessive liquid and heavy meal should be avoided. Moreover, elderly can read and think about pleasant thoughts but avoid watching unpleasant and stimulating movies before sleep (Neikrug, & Ancoli-Israel, 2010).
Another intervention that can be selected is sleep restriction. This is the third intervention that especially focused to improve sleep efficiency through mild sleep deprivation. Help the elderly to design and determine of sleeping time average and write it in activity log book. For example, if an elderly choose five hours (normally not less than five hours) as an average, he/she should maintain it 5 hours sleep each day. After 90% sleep efficiency attained, elderly are encouraged to increase sleep time by 15 minutes each day. In the opposite if the effectiveness 80% or less, sleep time must be decreased 15 minutes. It is importance to take note that wake time is kept in constant and bed time can be adjusted. For those older adults, short late afternoon nap is allowed (Krishnan & Hawranik, 2008).

Fourthly, elderly need to be informed and trained to engage in several relaxation therapies. Those therapies will decrease the occurrences of physiological, cognitive, or emotional arousal to allow sleep initiation or to reduce sleep latency. There are several relaxation techniques that include progressive muscle relaxation, meditation, abdominal breathing, imaginary training, electromyography/electroencephalography biofeedback (Rodrigues, 2015).

Furthermore, there is paradoxical intention to enable elderly improves sleep through cognitive restructuring or reverse psychology. This sixth intervention is a little bit tricky but it also has been proved to help increase sleeping quality. Elderly is asked to remain awake in order to decrease any anxiety about sleep. After that, elderly are encouraged to engage in the feared behavior of staying awake (Krisnan & Hawranik, 2008).

The next intervention lists is cognitive behavioral therapy (CBT). It is targeted to provide a sense of control and self-efficacy over sleep. Health provider helps the elderly to identify dysfunctional belief and attitude about sleep. As soon as dysfunctional are identified, help the elderly to replace those with more adaptive substitutes such as decatastrophizing, reappraisal, and attention shifting are some specific techniques used as adaptive substitutes. It is reported that using interventions based on CBT are superior to pharmacological treatment such as zopiclone. And it is effective for both in short- and long-term management of insomnia in older adults (Morin, Kowatch, Barry, and Walton, 1993; Sivertsen et al., 2006).

There is another alternative that can be used to treat insomnia. It is called hydrotherapy. It is utilizing water externally or internally in any of its forms (water, ice, steam) for health promotion or treatment of various diseases with various temperatures, pressure, duration, and site. Hydrotherapy also known as naturopathic treatment modality used widely in ancient cultures including India, Egypt, China. According to Kotimah (2012) hydrotherapy reduce insomnia in elderly in Indonesia. In her study, dipping feet of the elderly in warm water has proved its own effectiveness to reduce insomnia. Her experiment based on (Hegner, 2004) that dipping the feet in warm water around 37°C-39°C stimulates sleep. When reading article written by Mooventhan and Nivethitha (2014) with title Scientific Evidence-Based Effects of Hydrotherapy on Various Systems of the Body stated that evidence-based publication about the effect of hydrotherapies is already reported in various body system but it is hardly found that insomnia is reported there. Until now the report in publication of hydrotherapy in insomnia still limited. They suggested the future researcher to study more about this therapy and report it in scientific journals.

Mooventhan and Nivethitha recommendation has drawn the researcher attention to study more and further about effectiveness of the hydrotherapy in reducing sleep deficiency in elderly. Researchers using warm water in one group and a combination of warm water and cold water alternately in the next group. The result of the study reveals the different between using warm water alternately with cold water compare to the intervention when warm water is used alone. Significant of the study is giving addition to the previous nursing knowledge of sleeping management and can be used worldwide among health care provider.

Method
This study is quasi-experiment using one group before-after design. The population is all the elderly who experience insomnia with limited sample size of 10 elderly who are selected purposively with inclusion criterions: the level of insomnia is mild to moderate, participant is able to walk and sit appropriately for 30 minute, and tolerate to cold and warm water. Moreover the participant is mentally alert and able to receive and understand the instruction. The sample is divided into two group interventions. First group received the alternate warm and cold hydrotherapy and the second group only with warm hydrotherapy.
This study had passed the ethical clearance from faculty of nursing and University ethic committee, also from the director of local Community Health Service (PUSKESMAS). The permission also obtained from the local authority called Kepala Desa. Instrument in this study is Insomnia Rating Scale. Insomnia Rating Scale questionnaire has been validated in one of the Nursing Home and obtained the value of Cronbach’s Alpha 0.83. Other equipment such thermometers is utilized to measure the water temperature, two buckets to be used to soak the feet of participants, stop watch is used to accurately measure the length of intervention is the same from one participant to another participant, and personal towel also included to dry the participants feed after the intervention.

The interventions are conducted in the rural site of Parongpong, located in West Bandung, Indonesia. Interventions are implemented in participant home setting during April, 2017. Before the interventions are implemented, Insomnia level had been obtained. Those who suffer from mild and moderate insomnia are included as sample. Researcher has explained the purpose and the benefit of the study. It is told that elderly receive the intervention free and voluntarily. One of them who choose to be involved is given inform consent to be signed. To proceed, researcher arranged the time of intervention in the evening or two hours before they went to sleep. Interventions are done 30 minutes each day and completed after 11 days. In first group received the intervention only with warm water In the second group, participant received warm water and cold water alternately every 5 minutes. In the completion of the 11 days intervention, participants are evaluated using the same Insomnia Rating Scale. Data is analyzed using pair t test to obtained significant value before and after the interventions.

**Result**

Total number of the participants is ten. And all of them are aged 60 years old and over. All the ten participants are committed to complete 11 days of interventions. During 11 days of intervention, researcher observed that participants fall into a sleep during the warm water and cold water feet bath and also when warm water is used alone. This observation is supported by the data that can be seen in table-1.

As can be seen from the data in table-1, before the intervention using warm water feet bath, mean value was 2.454 and insomnia level is categorized as moderate insomnia. After the intervention mean value is decreased to 1.548 and insomnia level is categorized as mild insomnia. Furthermore, when looking into the table-1 it is also displayed that in the second group mean value before and after intervention is changed. Before the intervention it was 2.108, and insomnia level is classified into moderate insomnia. After the intervention of warm water and alternate with cold water feet bath is given, mean value is declined to 1.526 and insomnia level is classified into mild insomnia. It is certain that both interventions are effective to reduce insomnia level in elderly. It is provable that insomnia level dropped by one level.

Table-1 also displays the correlation within the subjects. Correlation within the subjects in group 2 is very strong. It is proved by the correlation value is 0.94. Correlation value in this group almost reaches the highest correlation value which is 1.000. In the opposite, in the first group the correlation is 0.370 and it is low in correlation. Meaning to say that warm and cold water feet bath has stronger correlation with insomnia level compare to warm water is used solely. It is also provable by significant values in which both of the groups are in different direction. In the first group significant value is 0.54 which is greater than > 0.05. In contrary, sig. value in the second group is 0.017 which is lower than 0.05. Even though in correlation they are differ but both of the intervention significantly effective to reduce insomnia level of the elderly. It can be seen through compare mean before and after the intervention and also through pair t test values. Mean value before and after the warm water feet bath is different by 0.9, and 0.58 for group warm water alternate with cold water intervention. Significant values for both groups are less than 0.05 (in the first group 0.000 and in the second group 0.001).

**Table-1**

<table>
<thead>
<tr>
<th>Paired sample</th>
<th>Statistic</th>
<th>Correlation</th>
<th>t-test</th>
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<tbody>
<tr>
<td></td>
<td>Sample</td>
<td>Mean</td>
<td>Correlation</td>
</tr>
<tr>
<td>1 Warm water feet bath</td>
<td>5</td>
<td>2.454</td>
<td>0.370</td>
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<tr>
<td>Before</td>
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<tr>
<td>After</td>
<td>1.548</td>
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<tr>
<td>2 Warm &amp; cold feet bath</td>
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Note: During April, 2017. The permission is obtained from the local authority Kepala Desa.
Discussion

Based on the result of the study, warm water feet bath and warm water alternate with cold water feet bath are effective to reduce insomnia level in elderly. The result is consistency with previous study that revealed how hot water bath can help to achieve a good sleep. It relaxes the body and mind by slightly raising the body temperature and after 15 minutes, it starts to drop slowly. This induces sleep indirectly. When the body temperature drop gradually, it make someone feel drowsy and therefore more prepared for sleep. In addition, more blood flow from the head to the lower part of the body. It reduces brain activity and mimics the pre-sleep state. Author also claimed that hot feet bath also induces sleep. It can still draw some blood from upper area of the body and make someone feel drowsy (Wickman, 2017). Raising the body temperature by warm water bath and sauna in different temperature indicated for better cardiac function and increases peripheral circulation (Iiyama, Matsushita, Tanaka, Kawahira, (2008)).

The result also revealed when warm water and cold water is given alternately, the correlation between intervention and insomnia are very strong. When warm water and cold water called contrast water (CW) are given alternately, the result will be better. Warm water causes vasodilatation in blood vessel and in contrary cold water causes vasoconstriction. It help blood vessel contract more effectively. As a result, it is easier for blood to circulate throughout the body (Movethan, and Nivethitna, 2014). Even only superficial cold application may cause physiologic reactions such as reduce vasodilatation or in the opposite causes vasoconstriction. In fact, it increases local anesthetic effects (Weston, Taber, Casagran, and Cornwall, 1994). Regular swim in cold water decreased tension, and negative mood. In different duration has significantly relieved pain and improved general well-being (Huttunen, Kokko, Ylijukuri, 2004). Furthermore, it also improves immunity, fatigue, and anxiety. It produces different effects on various body systems depend on the temperature of water (Movethan, and Nivethitna, 2014).

Despite of the limitation in sample size, both of the interventions have proved its own effectiveness in reducing insomnia level. Therefore it is recommended to all the health care providers particularly in community dwelling to use this intervention to help elderly to cope with their sleep difficulties. Future researcher may study the intervention using a larger sample or higher insomnia level or different temperature of the water and longer duration of the intervention.

References


