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Sand based on Transcultural Nursing as a Non-Pharmacological Therapy to Increase B-Endorphin Levels and Reduce Pain Osteoarthritis in Coastal Elderly

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ABSTRACT

Background: Culture Inability has an affect on the comes about of care, this may be done to supply consideration and welfare for the elderly. The marvel of inborn coastal communities with special traditions whose day by day propensities begin resting within the sand, playing within the sand, splashing on the shoreline, and giving birth within the sand. When the elderly sleep well on the sand and the HPA axis is suppressed, there is a decrease in ACTH and cortisol.

Purpose: Decrease ACTH and cortisol, stimulate POMC synthesis, and increase production of β endorphins that prevents the release of substance P as a key factor in the transmission of pain signals.

Methods: The study uses a quasi-experimental pre-post test control group design and includes a total of 82 elderly individuals aged 60-74 years, who experience osteoarthritis pain. The sample is divided into two groups, an experimental group of 41 individuals who sleep on the sand, and a control group of 41 individuals who sleep on mattresses. The implementation of sleeping on the sand was carried out for 30 days with a duration of 6-7 hours a day. data analysis with wilcoxon test and mann whitney test.

Results: The results show that there is a significant difference with p-value (<0.05) of post-test measurements on the thirtieth day on the variable β-endorphine level and pain scale. The intervention group showed difference between the pre-test and post-test after the intervention was given, with a p-value of 0.000 (<0.05).

Conclusion: The study concludes that sleeping on sand is an effective non-pharmacological therapy that can increase β-endorphin levels and reduce osteoarthritis pain in coastal elderly individuals. Transcultural nursing is able to maintain healthy behavior or sick behavior physically and psychoculturally according to cultural background. The study highlights the importance of considering the cultural background of the clients while providing nursing care.

Keywords: β endorphin, osteoarthritis, pain, sleeping on sand, transcultural nursing

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BACKGROUND

Torment within the elderly with osteoarthritis is by and large persistent torment, patients frequently look for elective treatments to reduce pain (Najafi, 2023). within the Legung village, Batang-Batang sub-district, The information shows that osteoarthritis could be a major issue within the elderly, particularly at the Legung Wellbeing Center, Batang-Batang Area, Sumenep Regency. Pain with osteoarthritis is a top priority for the elderly, where decreased pain conditions will stimulate the hypothalamus to release Corticotropin Releasing Hormone (CRH) with an increase in β-endorphin (Soonger 2005). Osteoarthritis is caused by biomechanical and biochemical changes in cartilage that occur due to multifactorial causes, including age, mechanical stress, or excessive use of joints, anatomic defects, obesity, genetic, humoral and cultural factors, where there will be an imbalance between degradation and synthesis. (Kapoor et al. 2021). Osteoarthritis pain is generally dull, involves the whole knee or is more localized, increases with use of the joint, and relieves with rest. In the further course of the disease, pain can also appear at rest and at night, so it can affect the comfort of sleep because of the increasing pain. Morning stiffness lasts less than 30 minutes, and stiffness occurs momentarily when resting or immobile during the day (Sharma, 2021).

Physiologically, pain occurs because a stimulus that hits the body (mechanical, thermal, chemical) will cause the release of chemical substances such as histamine, bradykinin, and potassium. These substances cause nociceptors to react, when nociceptors reach the pain threshold, nerve impulses will arise which will be carried by peripheral nerve fibers. There are two types of peripheral nerve fibers that will carry nerve impulses, namely α-delta fibers and c fibers. Nerve impulses will be carried along the nerve fibers to the dorsal horn of the spinal cord. These nerve impulses will cause the cornudorsalis to release neurotransmitters (substance P). Substance P causes synaptic transmission from peripheral nerves to the nerves of the spinothalamic tract. This allows nerve impulses to be transmitted further into the central nervous system. After the nerve impulses reach the brain, the brain processes the nerve impulses and then there will be a perception of pain as well as a protective reflex response to pain (Potter et al. 2013). Endorphins and other cleavage products produced in POMC titage processing mainly involve prohormone convertases (PC) 1 and 2. PC-1 breaks down POMC into adrenocorticotrophic biosynthetic intermediate hormones and β-lipotropic hormones. PC-2 breaks down β-lipotropic hormones into β-endorphins and –γ lipotropic hormones. β-endorphins are part of the opioid receptor agonist system. β-endorphins provide a stronger analgesic effect than morphine (Pilozzi, Carro, and Huang 2020).

Prevention methods are carried out at the East Legung Health Center with a health promotion strategy approach in the form of joint pain health counseling, so that efforts to prevent and control independently in the elderly are needed. in an effort to improve the health status of the elderly. The condition of sleeping on the sand is included in the pleasure activity, which is usually done by the elderly in coastal areas, which gives the effect of a good night's sleep. The use of beach sand for healing as part of non-pharmacological therapy has been carried out in several areas in Indonesia where sand is used as an alternative treatment, starting with bathing at Tembobor Beach for 15-30 minutes, after which sick residents plant themselves in the local sand. Those that can be cured with this therapy include kidney disease, shortness of breath, sore feet due to fatigue to difficulty walking (Rakhman 2013). Resting on sand may be a neighborhood culture that's one of the steps to bolster social, financial, and socio-cultural development. Cultural care is exceptionally vital for medical attendants to meet desires of the elderly, as portion of a non-pharmacological intercession in

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giving the most excellent conceivable care, where social failure has an affect on the comes about of care so that this will be done to supply consideration and welfare of the elderly towards expanding β-endorphin levels and scales. osteoarthritis torment in coastal elderly.

Therapeutic caretakers carrying out nursing care for the elderly ought to pay thought to the culture of the client so that therapeutic specialists can donate thought and welfare for the elderly concurring to culture in gathering the elemental needs of the elderly (Mirabelle, 2013; Sabri et al., 2019). The culture that's still kept up and acknowledged by the people of the coastal locale in Legung Town, Batang-Batang Zone, Sumenep Run the show, is the tradition of resting on sand which can make strides people's prosperity status. Resting on sand is parcel of the culture of the coastal communities of Madura. Regnani, (2014) communicated that the tradition of resting on the sand is pleased in by the community, feels comfortable, and does not harmed prosperity, whereas Kim & Kim-Godwin (2019) communicated that the rest development of the elderly is affected by culture-based desires. Hoenigman in Koentjaraningrat (2011) states that the form of culture according to transkultural nursing is divided into three of them first, values or ideas which are culture in the form of a collection of ideas, ideas, values, regulatory norms that are abstract, cannot be touched or touched which includes a history of sleeping on sand in the elderly and belief in sleeping on the sand which is a daily habit in the elderly. Both actions or activities are a form of culture as a patterned action from humans in that society whose nature can be observed and documented in everyday life which includes how to take sand, when to sleep in the sand, the duration of sleeping in the sand, the sleeping position in the sand. Third, objects or artifacts, namely forms of physical culture in the form of results from activities and can be directly touched by the five senses which include the shape of the sand, the quality of the sand, and the temperature of the sand. This research has received approval from the health research ethics committee of the Faculty of Nursing, Universitas Airlangga No. 2565-KEPK.

OBJECTIVE

The Purpose of this study was to analyze the Sand-Based transcultural nursing intervention to increase B-Endorphin levels and reduce osteoarthritis pain in coastal elderly.

METHODS

This study used a quantitative approach, a quasi-experimental design with a pre-post test control group design. This design is used to compare the effectiveness of the intervention given to the treatment group with the control group before and after the intervention. In carrying out the research, the treatment group received a cultural intervention of sleeping on sand based on transcultural nursing based on the modules that had been arranged, while the control group was the elderly who slept on mattresses. Both groups were measured for β-endorphin levels and the osteoarthritis pain scale

The research location is in Legung Timur Village, Batang-Batang District, Sumenep Madura Regency, Indonesia. The study population was all elderly aged 60-74 years who experienced osteoarthritis pain as many as 107 elderly. The sample in the study was some elderly aged 60-74 years who experienced osteoarthritis pain. The sampling technique used purposive sampling based on inclusion and exclusion criteria. Sampling was carried out by dividing into two groups, namely the elderly group sleeping on the sand as the experimental group and the elderly group sleeping on mattresses as the control group with a ratio of 1:1 so that the sample size in the elderly group sleeping on the sand was 41 respondents and the elderly sleeping on mattresses by 41 respondents. Researchers conducted cultural interventions based on transcultural nursing-based sleep culture modules, including;

Preparatory stage: cultural manifestations (artifacts) of sand-bed mattresses, 2). Implementation stage: transcultural nursing-based sleep on sand culture activity.

This study to determine differences in β-endorphin levels and pain scale in coastal elderly who had osteoarthritis before and after treatment in the experimental group and to determine differences in β-endorphin levels and pain scale in coastal elderly who experienced osteoarthritis before and after in the control group by doing the Wilcoxon test. with the alternative hypothesis accepted if p. ≤ 0.05 and to find out the effect of sleeping on sand based on transcultural nursing on β-endorphin levels and osteoarthritis pain scale in coastal elderly in the experimental group of elderly sleeping on sand and the control group of elderly sleeping on mattresses by carrying out the Mann Whitney test with the alternative hypothesis being accepted if p . ≤ 0.05.

RESULTS

Characteristics of respondents

Distribution of respondent characteristics based on gender, education level, occupation, and income in the intervention and control groups

Table 1. Distribution of respondent characteristics based on gender, education level, occupation, and income in the intervention and control groups (n=82)

Characteristics		InterventionGroup (n=41)		Control Group (n=41)		*p-value*
		Frequency	%	Frequency	%	
Gender						
1	Male	30	73.2%	28	68.3%	0.808[a]
2	Female	11	26.8%	13	31.7%	
Education						
1	No School	28	34.1%	27	32.9%	0.582[b]
2	Elementary School	7	8.5%	4	4.9%	
3	Junior High School	3	3.7%	3	3.7%	
4	Senior High School	3	3.7%	7	8.5%	
Occupation						
1	No Work	23	56.1%	18	43.9%	0.321[a]
2	Trader	8	19.5%	11	26.8%	
3	Fisherman	8	19.5%	12	9.3%	
4	Farmer	2	4.9%	0	0%	
Income						
1	Under Regional Minimum Income	32	78.0%	33	80.5%	1.000[a]
2	In accordance Regional Minimum Income	9	22.0%	8	19.5%	

Based on table 1. shows that the statistical test of different proportions on categorical data using the chi-square test obtained a p-value > 0.05 for data on gender. occupation. and income indicating that the variance of the data was the same or not different between the intervention and control groups. In addition. a statistical test of different proportions on categorical data using the Mann-Whitney test obtained a p-value > 0.05 for education data which indicates that the variance of the data is the same or not different between the intervention and control groups. So it can be concluded that the characteristics of respondents

based on gender. occupation. education. and income between the intervention group and the control group were declared homogeneous.

Description of assessment on β-endorphin level variables and osteoarthritis pain scale in coastal elderly

Table 2. Variable description of β-endorphin levels and osteoarthritis pain scale in coastal elderly (n=82)

Variable	Intervention		Control		P value
	Mean±SD	Median	Mean±SD	Median	
β endorphin					
Pre Test	3025,10±235,87	(211,56) 128,0-1320,4	310,31±235,87	206,70 (98,2-995,0)	0,967
Post Test	369,40±281,19	(247,47) 112,7-1321,5	274,04±234,44	171,64 (18,3-986,9)	0,006
Pvalue	0,008		0,006		
Pain Scale					
Pre test	7,27±1,78	(7) 4-10	7,41±1,449	(7) 5-10	0,842
Post test	5,29±2,23	(6) 1-9	7,29±1,569	(7) 4-10	0,000
	0,000		0,501		

Based on Table 2. shows that the pre-test measurements on the first day there was no significant difference in the mean between the intervention group and the control group in the variable β-endorphin levels and pain scale using the Mann-Whitney test with a significant p-value (> 0.05). then post-test measurements test on the thirtieth day on the variable β-endorphin level and pain scale showed that there was a significant difference in the mean p-value (<0.05).

The results of the Wilcoxon test statistic on the variable β-endorphin levels showed that there was a difference in the mean between the pre-test and post-test in the control group. where the difference was a decrease in β-endorphin levels with a median pre-test value of 206.70 and 171.64 in post-test. In addition. the intervention group showed a difference between the pre-test and post-test after being given an intervention for thirty days and the median value was an increase in β-endorphin levels with a pre-test value of 2.11.56 and a post-test of 2.47.47 and a p-value value(<0.05).

Based on statistical analysis using the Wilcoxon test on the pain scale variable. it showed that there was no meaningful difference between the pre-test and post-test in the control group with a p-value of 0.501 (> 0.05). while in the intervention group. it showed that there was a mean difference between pre-test and post-test after being given an intervention for thirty days with a p-value of 0.000 (<0.05).

DISCUSSION

Sleeping on sand is included as a pleasure activity for the elderly in Leggung Village. and as a habit for the elderly in coastal areas. Sleeping on the sand gives the effect of deep sleep. Deep sleep has an inhibitory effect on the hypothalamus-pituitary-adrenal (HPA) axis. whereas activation of the HPA axis can cause difficulty sleeping. When the elderly sleep well and the HPA axis is suppressed. there is a decrease in ACTH and cortisol. Decrease ACTH and Cortisol. stimulate POMC synthesis. and increase the production of β endorphins. (Smith et al. 2009). β-endorphins are basically synthesized and put away within the front pituitary organ from the forerunner protein proopiomelanocortin (POMC). In any case. later considers

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have appeared resistant framework cells are moreover able of β-endorphin union since resistant cells have the mRNA transcript for POMC3. and T lymphocytes. B lymphocytes. monocytes. and macrophages have been appeared to contain β-endorphins amid irritation (Jessop 1998; Mousa et al. 2004; Sprouse-Blum et al. 2010; Stein 1995).

The physiological detailing of β-endorphins in connection to torment can be expressed that β-endorphins are proteins that are primarily synthesized by the pituitary organ in reaction to physiological stressors such as torment which work to soothe torment when bound to mu-opioid receptors through different components within the central and fringe apprehensive frameworks. (Calogero et al.. 1988). A later meta-analysis of unremitting moo back torment patients experiencing different physical restoration methods illustrated β-endorphin as a potential restorative biomarker for clinical enhancement. Subsequently. in this ponder. β-endorphins got to be one of the biomarkers tried in elderly OA sufferers who gotten sand--based sleep interventions or therapy.

Previous research has been carried out on pain problems in various cases. showing that some non-invasive therapies given to relieve pain. provide outcomes in the form of increasing or improving β-endorphin levels. Patients with chronic low back pain experienced an increase in β-endorphin levels which was proportional to the decrease in pain complaints after receiving cranial electrotherapy stimulation (Gabis, Shklar, and Geva 2023). Another study in patients with lower leg pain experienced an increase in β-endorphin values after being given Repetitive Transcranial Magnetic Stimulation (rTMS) therapy(Ahmed, Mohamed, and Sayed 2021). The results of the meta-regression analysis were carried out to show the correlation of the pain scale with β-endorphin levels. where it was found that there was a significant relationship between decreasing pain scores and increasing β-endorphin levels in the group of people with low back pain after being given treatment or therapy (Choi and Lee 2019). Another study showed different results. namely knee osteoarthritis patients who were given tDCS therapy until the fifth session. showed a decrease in levels of inflammatory cytokines IL-6. IL-10. TNF-α. cortisol. including an increase in β endorphins (Suchting et al. 2020).

Sleeping on sand provides comfort and warmth. so it can be categorized as a fun activity. In addition to fulfilling the need for sleep. the culture of sleeping on sand also provides an additional effect. namely as a comfortable activity and provides a therapeutic effect. Fun activities and sleep therapy in the sand which gives a warm and comfortable sensation can stimulate the production of β-endorphins which are activated by the hypothalamus. Sleeping on sand has a good effect on elderly osteoarthritis. both in terms of the need for sleep. the therapeutic effect of increasing β-endorphin levels. and clinically as seen from the pain scale felt by the elderly OA in the treatment group. the implementation of transcultural nursing-based sleeping on sand culture modules can reduce the osteoarthritis pain scale in coastal elderly. the results of this study are supported by the results of Regnani. (2014) research. that sleeping on the sand for East Legung coastal elderly can overcome pain.

The culture can be used as part of an independent nursing process. namely the tradition of sleeping on sand based on transcultural nursing in reducing the pain scale of osteoarthritis in coastal elderly. The osteoarthritis pain scale can decrease due to somatosensory stimulation. such as the touch of sand and changes in the temperature of the sand. then the stimulation will be delivered by large nerve fibers which will cause inhibitory neurons to become active. However. inhibitory neurons prevent the projection cells from sending signals to the brain. so the gates are still closed and there is no perception of pain (Ardinata 2022). The theory of transcultural nursing is oriented to a health service system based on individual culture. family. and community groups. this hypothesis states that

nursing administrations to clients have to be pay consideration to social values within the setting of wellbeing and ailment since each person can characterize culture based on their possess encounters and discernments. The culture in question is the beliefs. norms. or values of the life practices of a special group which become a guide in carrying out daily actions where in this study it is stated that sleeping on sand can be part of the daily life of coastal elderly. this is the belief of the elderly in doing daily actions by sleeping on the sand so that it is necessary to empower this tradition to maintain the legacy of previous ancestors **(**Madeleine M & Marilyn R (2002); Untari. (2018). Confidence is a human attitude when he feels he knows enough and concludes that he has reached the truth. In believing that sleeping on sand can reduce osteoarthritis pain. it can be explained that belief is a positive perception where the amygdala will send information to the locus coeruleus (LC) which will react to the autonomic nerves via the hypothalamus. secreting neurotransmitters. endorphins and enkephalins which function as pain relievers and CRF inhibitors (Corticotropic Releasing Factor) in excess (Lemmers-Jansen et al. 2020; Neugebauer 2020).

CONCLUSION

Implementation of the transcultural nursing-based sand bed culture module can increase β-endorphin levels and reduce the pain scale of coastal elderly with osteoarthritis so that in this study it can be recommended that transcultural nursing-based sand bed sleep as a non-pharmacological therapy to increase β-endorphin levels and reduce osteoarthritis pain in coastal elderly. It is recommended to develop a transcultural nursing training module that integrates sand sleep therapy as part of a culture-based nursing care approach. Further research with a wider scope is needed to explore the long-term effectiveness and the influence of environmental factors such as humidity. sand temperature. and sleeping position on therapy outcomes. Local governments can consider developing local culture-based health services as a form of cultural preservation while improving the quality of life of the elderly.

CONFLICTS OF INTEREST

No Conflict Of Interest

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