ARTICLE

IMPACT OF ARENGA PINNATA ADMINISTRATION COMBINED WITH TAI-CHI GYMNASTICS ON BONE DENSITY IN MENOPAUSAL WOMEN

Safrina*, Sri Hernawati Sirait

Program Studi Kebidanan Pematangsiantar, Poltekkes Kemenkes, Sumatera Utara, Medan, INDONESIA

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ABSTRACT

Various tissues are present in the human body and one of the most important tissues which play a pivotal role in movement, strength and stability is the bone. Bone like every other living tissue constantly has to be repaired and renewed also occurs hand in hand. It is well established that there is gradual loss of bone with aging in adults, but major bone loss in women occurs with loss of oestrogen at the menopause. Various ways have been employed towards reduction of symptoms accompanying osteoporosis a notable one is the relaxation of footwork (stretching) included in relaxation techniques. Apart from relaxation techniques there are also other ways to reduce pain and an example of this is the 'tai-chi gymnastics'. *Arenga pinnata* is a type of palm tree growing in tropical forests and is considered as one of the most diverse multipurpose tree species. In this study the effect of the effect of combination of *Arenga pinnata* and Tai-Chi gymnastics on bone density was assessed. From this study it was concluded that bone density change was noticed after intervention using combination of Tai-Chi gymnastic with *Arenga pinnata* was carried out and the change was statistically significant. Therefore it can be concluded that administration of *Arenga pinnata* with Tai-Chi gymnastics has a significance effect on improving bone density in postmenopausal women.

KEY WORDS
Tai-Chi, Bone density, menopause, osteoporosis

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***Corresponding Author**
Email:safrinausu@yahoo.com
Tel.:+62-85883439716

INTRODUCTION

Various tissues are present in the human body and one of the most important tissues which play a pivotal role in movement, strength and stability is the bone [1]. Bone like every other living tissue constantly has to be repaired and renewed also occurs hand in hand. This process is continuous because the daily damages although microscopic that occurs within the bone. The process by which this ours is called bone turnover and is carried and certain cells in the bone are responsible for this [2]. The most important of them been the one set (osteoclasts) that are involve in digging up bone whilst the other set (osteoblasts) lay down new bone. Like every other process within the body this process is well balanced and the activities of one cell does not out run that of the other. If there is a relative increase in bone removal, which is notable after the age of menopause in women bone tissues loss become progressively increasing and bones become thinner [3, 4]. It is well established that there is gradual loss of bone with aging in adults, but major bone loss in women occurs with loss of oestrogen at the menopause. The drastic loss of estrogen hormone that occurs after menopause increases the risk of decreased bone density which is often times accompanied by increased calcium wasted excretion from a woman's body. This will gradually cause a decrease in bone density or a reduction in the mass of bone tissue per unit volume (g/cm^2), so the bones become thinner, more fragile and contain less calcium or bone more porous, a commutation of processes known as osteoporosis [5]. Osteoporosis which is known as the thin bone disease currently is estimated to affect more than three million people in the UK with postmenopausal women being the most affected [6, 10].

Various ways have been employed towards reduction of symptoms accompanying osteoporosis a notable one is the relaxation of footwork (stretching) included in relaxation techniques. Apart from relaxation techniques there are also other ways to reduce pain and an example of this is the 'tai chi gymnastics', which is noted for its benefit of increasing muscle tone and strengthen muscle-muscle weakness enabling joints to become more flexible muscles which will result on the long run participants in this activity ability to feel more comfortable with pain due to the reduction in threshold of pain accomplished. *Arenga pinnata* is a type of palm tree growing in tropical forests and is native to the Indo-Malayan archipelago, easily found in South and Southeast Asia [7]. Among the 3000 palm species of the tropics and subtropics categorized as multipurpose trees, the *Arenga pinnata* tree is considered as one of the most diverse multipurpose tree species under culture, and the only one attracting widespread economic interest [8, 9]. The aim of this study is to impact of Tai-Chi gymnastics with *Arenga pinnata* administration on bone density in menopausal women.

MATERIALS AND METHODS

For this study, 50 postmenopausal women were recruited. The inclusion criteria were that they should be postmenopausal and should also be involved in tai chi gymnastics while those postmenopausal women that didn't meet this requirement were excluded from this study. The selected 50 women were then divided into two groups respectively for this study.

Group 1: These consist of 25 postmenopausal women who served as the control group and only participated in Tai-Chi gymnastic without been administrated *Arenga pinnata.*

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Group 2: These consist of 25 postmenopausal women who served as the intervention group and participated in Tai-Chi gymnastic and *Arenga pinnata* was also administrated to them.

In this study the Tai-Chi gymnastics is performed every three weeks for 3 months and kaling is given 100 grams / day for three months to the intervention group while the control group performed Tai-Chi gymnastics only every three weeks for three months without taking *Arenga pinnata.* After the period of 3 months elapsed, the administration of *Arenga pinnata* was stopped and both groups were assessed. Univariate analysis was done in this study aims to see the description of the frequency distribution of respondent characteristics studied in both groups namely tai chi gymnastics and Tai-Chi gymnastics + *Arenga pinnata* while bivariate analysis differences in bone density in both groups of respondents was also assessed.

Written consent was taken from all the participating subjects and the work was approved by the ethical approval committee of Ministry of health of republic of Indonesia.

RESULTS

[Table 1] show characteristics of both groups of participants in this study while [Table 2] shows bivariate analysis differences in bone density in both groups of respondents and for [Table 2], the statistical test results showed no difference between the two groups (p> 0.05). [Table 3] shows that the average bone density level before intervention in the tai-chi gymnastic group is lower at 44.33 ± 11.96 BQI than the Tai-Chi + *Arenga pinnata* gymnastics group which is 53.33 ± 12.87 BQI with the difference of 8.99 BQI and the statistical test results showed that there was a difference between the two groups (p <0.05). [Table 4] shows the differences in bone density before and after intervention in the Tai-Chi gymnastic and the results of statistical tests showed there were differences before and after Tai-Chi gymnastics (p <0.05). These results can be seen in the following [Table 1] description below.

Table 1: Characteristics of both groups of research respondents

Variable	Tai- chi gymnastic (n=25) (Average ±SD)	Tai-chi gymnastic and *Argena pinnata* (n=25) (Average ± SD)
Age	59.92±3.88	58.96±5.76
Body weight	58.80±5.39	60.48±5.92
Height	153.8±4.08	154.6±4.29
Initial menopause age	13.76±1.29	13.44±1.16
Final menopausal age	50.68±3.57	50.2±3.36
Density level Before gymnastics	41.24±12.66	42.47±11.10
Density levels After gymnastics	44.33±11.96	53.33±12.87

Table 2: Differences in bone density in both groups prior to the intervention

Group	n	Average ± SD (BQI)	Average difference (IK 95%)	*p*
Tai-Chi gymnastic	25	41.24±12,66	1.23 (5.54 - 8.00)	0.716
Tai-Chi+ *Arenga pinnata*	25	42.47±11,10		

Table 3: Average group bone density before intervention

Group	N	Average ± SD (BQI)	Average difference (IK 95%)	*p*
Tai-Chi gymnastics	25	44.33±11,96	8.99 (1.93– 16.06)	0.014
Tai-Chi exercise + *Arenga pinnata*	25	53.33±12.87		

Table 4: Differences in bone density before and after intervention in the tai chi gymnastic group

	N	Average ±SD (BQI)	Average difference (IK 95%)	*p*
Before Tai-Chi gymnastic	25	41.24±12.66	3.09 (1.85 - 5.16)	0.000
After Tai-Chi exercise	25	44.33±11.96		

CONCLUSION

The administration of *Arenga pinnata* in combination with Tai-Chi gymnastics had a significance effect on improving bone density unlike when tai chi gymnastics is done alone. This finding is of benefits in making treatment of low bone density in postmenopausal women easy. Therefore, it is recommended that this should be practice and this extra benefit should be maximize towards preventing or delaying osteoporosis in postmenopausal women. Also due to the limited research in this field, it is also recommended that more

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research should be done to further authenticate this perceive benefits of combination of Tai-Chi gymnastics with *Arenga pinnata* on bone density improvement in postmenopausal women.

CONFLICT OF INTEREST

Nil

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