

Use of cabbage leaves (*Brassica oleracea* var. *acephala*) in the stabilization of bone mass after menopause

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RESUMO: “Uso do suco das folhas da couve (*Brassica oleracea* var. *acephala*), na estabilização da massa óssea pós-menopausa”. Neste trabalho foi avaliado a utilização da folha da couve *Brassica oleracea* variedade *acephala*, pertencente à família Cruciferae, para estabilizar a massa óssea em 13 mulheres após a menopausa. As folhas da couve foram usadas após retirar a nervura principal e o pecíolo, na forma de suco de uma folha ao dia, durante 24 meses. Foi realizado a cada seis meses o exame de densitometria óssea para avaliar os resultados. Os locais de medição foram o trocanter e o triângulo de Ward. De acordo com os resultados encontrados, podemos concluir que o uso da folha da couve foi capaz de estabilizar a massa óssea nos sítios estudados, com perspectivas do seu uso também como opção importante para prevenção da doença.

Unitermos: *Brassica oleracea* var. *acephala*, Cruciferae, couve, osteoporose, menopausa.

ABSTRACT: This work evaluates the use of cabbage leaves, *Brassica oleracea* var. *acephala* (Cruciferae family) to stabilize bone mass in 13 menopausal women. The mature leaves were used after removal of the midrib and petiole and taken as a juice and given to the patient once a day for 24 months. Densitometric exams were performed every six months. The measurement points were the Trochanter and Ward's triangle. According to the results found, the use of cabbage leaf juice results in bone mass stabilization at the points studied, with perspectives for its use as an important option in disease prevention.

Keywords: *Brassica oleracea* var. *acephala*, Cruciferae, cabbage, osteoporosis, menopause.

INTRODUCTION

At present, the need to know and prevent aging related diseases in the population is a factor which receives much attention all over the world. The researchers and health sectors concern is to understand and resolve in a definitive or preventive way the several diseases that accumulate specially after the age of 40. Among those diseases, osteoporosis has stood out because it is a chronic, multifactorial disease which occurs in both sexes, albeit more common in women after menopause. It is characterized by the progressive loss of bone mass and the deterioration of bone tissue microarchitecture, which becomes more susceptible to fractures (Wilson; Foster, 1988; Compston, 1990). In Brazil in the 90's, women represented 55% of the population over 60. Taking into account that the risk of vertebrae and hip fractures in white menopausal women is around 15-17%, it can be concluded that at least one third of them will suffer osteoporotic fracture (Melton; Altkorn, 1991). The use of modern techniques such as bone densitometry has made the diagnosis and prevention of this disease possible. However, the high cost of this exam excludes its use for the majority of the population (Pereira et al., 2002).

It is possible to prevent osteoporosis with the

use of physical exercises, hormone reposition therapy, and calcium-rich diet. It is also necessary to change habits which may somehow interfere in the absorption and the permanence of calcium in the organism such as tabagism (Griffin, 1990; Seeman; Tsalamandris, 1994; McCulloch et al., 1990; Slemenda et al., 1992); alcohol (Sowers; Galuska, 1993), and caffeine (Tassinari et al., 1991) consumption.

At present, several therapies are used to treat osteoporosis, they include: hormone reposition therapy (Felson; Zhang, 1993; Lindsay; Hart, 1976), calcium and vitamin D supplementation (Riis, 1987; Resnick; Greenispan, 1989; Chapuy; Arlot, 1992; Tilyard; Spears, 1992), tibolone (Belchetz, 1994), calcitonin (Correia, 1992; Reginster, 1992) and bisfosfonate (Riggs; Melton III, 1992). However, these therapies cannot recuperate significantly bone mass lost after menopause, and in many cases they result only in its stabilization.

Despite all developments, the number of medicinal plants studied from the chemical and pharmacological viewpoint is very small, and even in developed countries their use is related to the application of active principles, making the research of this untapped field attractive in current research (Pereira et al., 2002; Silva et al., 2003; Rocha et al., 2005; Falcão et al., 2005;

Barbosa-Filho et al., 2005; Barbosa-Filho et al., 2006a,b). Use of ethnopharmacological knowledge is one attractive way to reduce empiricism and enhance the probability of success in new drug-finding efforts (Patwardhan, 2005; Cordell; Colvard, 2005). The use of cabbage (*Brassica oleracea* var. *acephala*) in popular medicine has been passed on from generation to generation with very interesting reports of improvement and cure of many diseases, such as gastritis, rheumatism, ulcer, bone weakness, vision diseases, hepatic diseases, anemia; while it is much recommended for developing children (Almeida, 1993). As preventive methods are not available to all patients, we aim to evaluate the importance of the use of cabbage leaves in the stabilization of bone mass to make this means of prevention more accessible to the population at large, due especially to its easy access and low cost.

MATERIAL AND METHODS

The leaves of cabbage (*Brassica oleracea* var. *acephala*) were collected in the city of João Pessoa, Paraíba, Brazil in April 2004. A voucher specimen (Agra et al. 5960) is kept at the herbarium Prof. Lauro Pires Xavier, João Pessoa, Paraíba, Brazil.

Mature cabbage leaves weighing approximately 20 g were used after removal of the midrib, cutting them in small pieces and blending them with 400 mL water. This juice was taken between meals once a day.

The study was carried out with 13 menopausal women with osteoporosis with an average age of 58.5 who took cabbage leaf juice once a day for 24 months. Bone densitometry was carried out at 0, six, twelve, eighteen and twenty-four months.

Bone mass was determined using bone densitometry. Exams were carried out with DEXA densitometry using gandolin 153 for photonic emission with values between 44 and 100 KeV.

Statistical analysis. Bone mineral density (BMD) results in g/cm² on Ward's triangle and Trocanter in menopausal patients were submitted to variance analysis for an entirely randomized delineation using the F test to compare the average square of exam time with the quantity of cabbage leaves, according to Pimentel-Gomes (1985). The comparison of average exam times with the quantity of cabbage leaves was preceded by the Tukey test at the 5% probability level (Steel; Torrie, 1960; Pimentel-Gomes, 1985). For the statistical analysis, the software Statistical Analysis Symidrib (SAS), described by SAS Institutue (1997) was used.

RESULTS

Table 1 shows the variance analysis of bone mineral density (BMD) in g/cm² in the Ward's triangle and the Trocanter in menopausal patients. The results did not show a significant difference. The results given in Table

2 for the average values of BMD in the Ward's triangle and the Trocanter did not present a statistically significant difference either. Table 3 displays the values found for T-score and Z-score in relation to the time. Their results did not vary with statistic significance. BMD values as a function of exam time for the Ward's triangle and the Trocanter are displayed in Figures 1 and 2, respectively. These results did not present a statistically significant difference.

DISCUSSION

In our experiments the botanical material was prepared as it is used popularly, cabbage leaf juice, fresh, after the removal of the midrib. At present the consensus is that the possibility of occurrence of fractures increases directly with the decrease in bone mass. The risk increases between 1.5 to 2.5 times for each decrease of 1 standard deviation, doubling for losses higher than 10% (Cummings et al., 1993). Current epidemiological studies tend to define fracture risk in any part of the skeleton by means of a single measure, thus, for example, for the femur fracture risk it is necessary to evaluate the bone mineral density at this site (Grinley et al., 1979). The densitometric measurements carried out in the Trocanter and the Ward's triangle are important to detect bone mineral density loss in the proximal femur, being also indicated for monitoring osteoporosis treatment (Johnston et al., 1991). The evaluation criteria used in this study agree with the operational definition to measure bone mass described by Mazaes (1987). As shown in Table 1, the variance analysis of bone mineral density (BMD) in Ward's triangle and Trocanter did not present any significant difference ($P > 0.05$) in the bone mineral density in relation to time, showing that the use of cabbage leaf juice in stabilizing bone mass was successful in the time frame studied. The analysis of the average values of bone mineral density in Ward's triangle and the Trocanter in relation to time (Table 2) revealed no significant difference in BMD ($P > 0.05$) between examination times. There is no statistically significant difference in relation to T-score and Z-score for the times analyzed, as shown in Table 3. These results indicate that the variation in bone mineral density in the period of 24 months was not statistically significant. As shown in Figure 1, in relation to Ward's triangle, there was a rapid increase in BMD in the first six months, later decreasing within a period of twenty-four months, however the variations are not statistically significant ($P > 0.05$), likewise for the Trocanter, as shown in Figure 2. These results show that the therapy with cabbage leaf juice successfully inhibited bone mass loss in Ward's triangle and the Trocanter in the time frame studied; similar results are described in relation to calcium supplementation, which is only able to stabilize bone mass (Rigss; Melton III, 1992). However, it is valuable as an adjuvant, potentiating the effects of other therapies (Riis, 1987; Resnick; Greenispan, 1989).

Table 1. Variance analysis of bone mineral density (BMD) in g/cm² in Ward's triangle and Trochanter of menopausal patients.

Variation Sources	DF	Average Squares	
		Ward's triangle	Trochanter
Exam Time	3	0.0061025 ns	0.0005539 ns
Linear	1	0.0007046 ns	0.0011976 ns
Quadratic	1	0.0175757 ns	0.0004561 ns
Cubic	1	0.0000271 ns	0.0000081 ns
Residue	48	0.0206899	0.0117838
VC(%)	-	20.39	15.30

ns – not significant.
 VC (Variation coefficient)
 DF (Degree of freedom)

Table 2. Average values of bone mineral density (BMD) in the Ward's triangle and the Trochanter in menopausal patients.

Exam Time (months)	Ward's triangle (g/cm ²)	Trochanter (g/cm ²)
6	0.692 a	0.713 a
12	0.726 a	0.714 a
18	0.721 a	0.711 a
24	0.682 a	0.700 a
General average	0.705	0.710
MSD (Tukey at 5%)	0.150	0.113

a = In columns, averages followed by the same letter did not differ significantly from each other by the Tukey test at 5% probability.
 MSD (Minimal significant difference in Tukey at 5% probability)

Table 3. Values of bone mineral densitometry (BMD) in Ward's triangle and Trochanter of patients examined in relation to T-score and Z-score.

Time (months)	Ward's triangle		Trochanter	
	T	Z	T	Z
6	78.50	96.10	91.90	99.80
12	80.60	99.90	91.90	100.00
18	81.30	100.40	90.90	99.00
24	76.90	95.60	89.30	97.50
Average	79.33	98.00	91.00	99.08
F Test	0.16 ns	0.45 ns	0.07 ns	0.11
VC (%)	19.95	12.01	15.99	10.72
MSD	19.07	14.18	17.53	12.80

ns (Not significant)
 VC (Variation coefficient)
 MSD (Minimal significant difference in Tukey at 5% probability)

This fact is extremely important, since the medicines presently used for this purpose are rather expensive, which excludes their use by most patients. The use of cabbage leaf juice is of easy access and inexpensive, which makes the implementation of bone mass loss prevention programs in post-menopausal patients simple. In addition, this treatment would probably also be valuable in the prevention of bone mass loss occurring in abnormal levels in this age group.

On the occasion of the densitometry exams every six months, the patients' reports were interesting and significant, calling our attention mainly to the improvement of the gastric (gastritis) and ophthalmologic problems,

with the improvement of sight during treatment time. At the end of the study period (twenty-four months), there were reports of reduction of gastric and ophthalmologic problems. This suggests that a better evaluation and study should be made in future research.

CONCLUSION

The present work shows that the use of cabbage leaf juice once a day led to the stabilization of bone mass in the sites analyzed while it can also be used as a means of prevention either in isolation or as an auxiliary to existing therapy. The easy access to the product at a

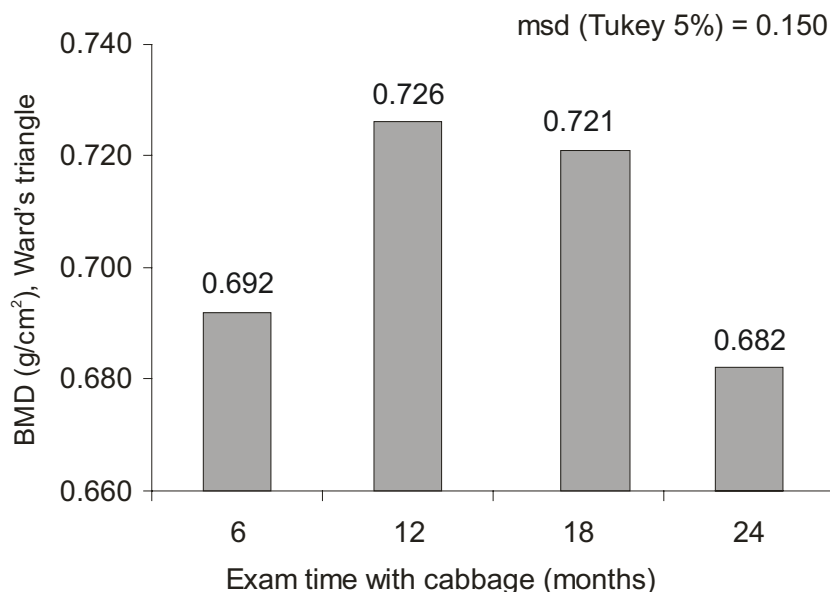


Figure 1. Bone mineral density in Ward's triangle in menopausal patients as a function of exam time with cabbage leave.

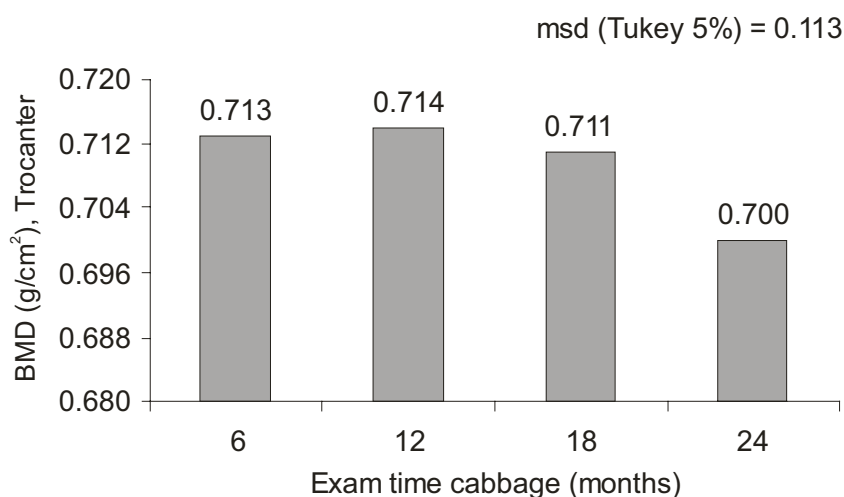


Figure 2. Bone Mineral Density in Trochanter in menopausal patients as a function of exam time with cabbage leave.

practically insignificant cost makes its use possible by underprivileged classes.

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