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# Analysis of postural stability and body composition of women after unilateral mastectomy

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**Summary**
**Introduction:** The electrical bioimpedance method allows a non-invasive and precise assessment of the content of fat tissue, muscle mass or the amount of fluid in the body depending on the state of health or lifestyle. Changes in anthropometric features may affect postural stability, general physical fitness of women after mastectomy. In addition, changes in the distribution and amount of fat and lean body components may affect the ability to maintain balance. **Aim of the study:** Analysis of the relationship between postural stability and body composition of women after mastectomy based on posturographic examination. **Material and methods:** The study involved 40 women after mastectomy aged from 52 to 87 years. Postural Stability Test in static and dynamic mode on the Biodex Balance System platform was used to

assess postural stability. The body bioimpedance method (BIA) was used to analyze the body composition. The research tool was the body composition analyzer Tanita MC 780 MA. The research was carried out in the Posturology Laboratory of the Institute of Physiotherapy at the Jan Kochanowski University in Kielce. **Results and conclusions:** Based on the research, a significant correlation was observed with a negative correlation in the Postural Stability Test, in static mode between fat mass and postural stability indexes. Also significant statistical results with a positive correlation were demonstrated in the same test between the total body water content and the postural stability indexes. Postural Stability Test in dynamic mode showed significant influence of lean and muscle mass in maintaining a stable posture. The standing posture of women after mastectomy was characterized by larger sublimations in the sagittal plane than the frontal plane (A / P> M // L).

**Key words:** body composition, Postural stability. Mastectomy

## Admission

Breast cancer is the most common cancer in women in Poland and worldwide, and epidemiological data confirm the sustained upward trend of morbidity. This dynamics may indicate among other things, changes in lifestyle and aging of the population [1]. The aging process is a period, in which there is a lot of changes in the composition and structure of the body. Changes in anthropometric characteristics may affect the postural stability, overall physical fitness of women after mastectomy. [4] In addition, changes in the distribution and quantity of fat and fat-free body components can have an impact on the ability to maintain balance [4]. Mastectomy, however, it involves many complications, such as limitation of motion and muscle weakness of the shoulder girdle and upper extremity lymphedema on the operated side [2]. Consequently, there is a disturbance across the biomechanics of the body, which in turn hinders the daily functioning [3]. Static and dynamic computer posturography allows to analyze the postural reactions in conditions of sensory conflict. Maintaining a stable posture requires the activity of the three sensory systems: atrial, proprioceptive and visual [5,6]. Proprioreceptors and sight are particularly sensitive to the oscillating movements of the body in motion and in the rest. In addition, the vestibular system through an independent control of the eye and head orientation improves the precision of complex motor activity [7].

## Objectives

The aim of the study was to analyze the relationship between postural stability and body composition of women after mastectomy based on the posturographic test.

**Material and methods**

The study involved 40 women after mastectomy belonging to the "Amazonki" Club of the Świętokrzyskie Province at the Świętokrzyski Center of Oncology in Kielce. The age range of the patients ranged from 52 to 87 years (mean 68.5 years). To assess postural stability platform there was used Biodex Balance System. Postural Stability Test (Postural Stablitiy Test) was taken in the static mode and the dynamic position with both feet on stable and movable base with the eyes open.

Postural Stability Test consisted of three 20 - second samples separated by a 10 - second pause. The patient's eyes during the test were focused on the screen, where the characteristic dot appeared (COP - center of pressure), which reflected the centre of the body mass. In fact, the COP is the point of application of the resultant force of the foundation reaction. The task of the patients was to coordinate the body, so that the centre of gravity of the body was in the centre of the circle visible on the monitor at the intersection of the coordinate axes. Position was determined by writing on the screen of the camera angle of the feet with the use of the centre line (range 0 ° -45 ° separately for left and right foot, for example. 25 ° for the left foot and 30 ° on the right foot) and the heel position (scale B - J, 1 - 21 separately for left and right foot, for example. F7 left foot and right foot E15. During the test, the patients had a prosthesis on the side of the performed mastectomy. Research in dynamic mode proceeded in a similar manner using additional mobile platforms. In patients after mastectomy at the beginning of the test, level 12 (the most stable) was activated and then gradually the device went to level 6, which is a more difficult mode with an unstable platform surface [8,14]. The index (indicator) of stability will be used for statistical evaluation: general, anterior / posterior and medial / lateral.

1. The Total Stability Index (SI) reflects the variability of the platform's position from the horizontal plane expressed in degrees over time of all movements performed in the test. Its high value indicates a large number of movements performed during the test.
2. The anterior / posterior Stability Index (A / P) reflects the variation of the platform position for sagittal plane movements expressed in degrees.
3. The medial / later Stability Index (M / L) reflects the variation in the position of the platform for the movements in the frontal plane expressed in degrees [8].
4. Percent of time in the zone / square represents the process of duration of the entire test that the patient has spent in a given zone / square.

Target zones A, B, C and D are equal to the degree of inclination of the platform. They are determined by concentric circles with the middle in the center of the platform.

Zone A - from zero to five degrees deviation with relation to the horizontal plane

– Zone B - from six to ten degrees deviation with relation to the horizontal plane
– Zone C - from eleven to fifteen degrees deviation with relation to the horizontal plane
– Zone D - from sixteen to twenty degrees deviation with relation to the horizontal plane.

The squares represent the four quadrants of the test chart between the axes X and Y. For Protocol, "both feet" ( "Both Feed"):

– Square 1 - front right,
– Square 2 - front left
– Square 3 - left back,
– Square 4 - right back.

Scoring women after mastectomy in this test depends on the number of deviations from the centre, which means that the lower the score the better the postural stability [9 -13]. The basic criterion used for the qualification of people in the study group was the ability to self-support in a standing position and no visual disturbances.

Bioimpedance method was used for the body composition analysis (BIA), which is based on the resistance of body tissues for electricity. Better muscular conductivity is possessed by muscular tissue due to the large amount of water, while fat tissue is resistant because it contains water in small amounts. BIA is a reliable, non-invasive and easily available method for evaluating parameters of the body composition. The research tool was a body composition analyzer Tanita MC 780 MA. The following parameters were obtained as a result of the measurement: body weight (kg), body mass index (BMI), fat mass FM (%), fat mass - FM (kg), fat-free mass - FFM (kg), muscle mass - MM (kg) , Total Body Water - TBW (kg) and Total Body Water - TBW (%) [8].

All parameters recorded by the posturographic platform were collected in a completely non-invasive way, and the device was safe for the research group. The test was performed in May 2016 in Posturology Laboratory of the Institute of Physiotherapy WLiNoZ UJK in Kielce. Statistical analyzes were performed using Statistica PL 13.1. The relationship between postural stability indicators and parameters of the body composition were assessed using Spearman's rank correlation coefficients. Statistical significance was assumed at $p <0.05$.

## Results

The average age of the studied group was 68.5 years with a standard deviation of ± 8.80. The median value for the distribution of results of this scale is 68 years, and the range of the age range from 52 to 87 years. The average body height was 160.1 cm with a standard deviation of

± 5.10 cm. The median value for the distribution of the results of this scale is 159 cm, and the range of the growth range from 149 to 172 cm. The average body weight was 70.6 kg with a standard deviation of ± 10.1 kg. The median value for the distribution of the results of this scale is 69.8 kg, and the range of the range from 47.1 to 96.1 kg. The mean body mass index (BMI) was 27.5 kg / m² with a standard deviation of ± 3.8 kg / m². The median value for the distribution of the results of this scale is 27 kg / m², and the range of the range from 19.7 to 38.5 kg / m². The mean value of the overall static stability indicator was 1.11 with a standard deviation of ± 0.94. The median distribution of the results of this scale is 0.75, and the range of results from 0.3 to 4.8. The average value of the stability index a / p was 0.82 with a standard deviation of ± 0.82. The median distribution of the results of this scale is 0.4, and the range of results from 0.2 to 4.5. The average value of the stability index m / l was 0.51 with a standard deviation of ± 0.47. The median distribution of the results of this scale is 0.3, and the range of results from 0.1 to 2.3.

During the Postural Stability Test in static mode, most women after mastectomy remained in Zone A (96.90%). During the patient's trials for 44.35% of the time, they most often carried the body's center of gravity in the right-posterior direction (Quadrant 4), standard deviation 23.32; median value 47; range of results from 7-92 (table 1). The mean value of the overall dynamic mode stability index was 1.81 with a standard deviation of ± 0.84. The median distribution of the results of this scale is 1.6, and the range of results from 0.8 to 5.2. The average value of the stability index a / p was 1.4 with a standard deviation of ± 0.8. The median distribution of the results of this scale is 1.2, and the range of results from 0.4 to 4.3. The average value of the stability index m / l was 0.87 with a standard deviation of ± 0.4. The median distribution of the results of this scale is 0.75, and the range of results from 0.4 to 2.2.

During the Postural Stability Test in dynamic mode, most women after mastectomy remained in Zone A (97.75%). During the patient's attempts for 28.80% of the time, they most often carried the body's center of gravity towards the left-rear direction(Quadrant 3), standard deviation 23.32; median value 47; range of results from 7-92. The average time spent in Quadrant 4 (right-back direction) was 25.28%; standard deviation 21.84; median value 22; range of results from 0-87. The average time spent in Quadrant 2 (left-front direction) was 23.38%; standard deviation 26.70; median value of 10; range of results from 0-100. The average time spent in Quadrant 1 (right-front direction) was 22.55%; standard deviation of 25.93; median value 13.5; range of results from 0-98 (tab.2). The average fat mass (%) was 33.32; standard deviation 5.43; median value 34.15; range of results from 18.50-43.60, while the average fat mass (kg) was 23.88 standard deviation 6.50; median value 24.55; range of results from 8.70-41.90. The average free fat mass (kg) was 46.70; standard deviation 4.90; median value 47.25; range of results from 37.0-57.70. Average muscle mass (kg) was 44.30; standard deviation 4.67; median value 44.85; range of results from 35/10-54.80. The total water content in the body (kg) was 32.87; standard deviation 3.54; median value 33.35; range of results from 25.70 - 40.70. The average total water in the body (%) was 46.96; standard deviation 3.77; median value 46.30; range of results from 39.80 - 56.50 (Table 3). The analysis of the relationship between posture stability indexes and body composition parameters showed a significant negative correlation, among others: between fat mass (%) and the general stability index (r = -0.4171 p = 0.007), stability index a / p (r = -0.3363 , p = 0.034), stability indicator m / l (r = -0.5042, p = 0.001), zone A (r = 0.4328, p = 0.005), zone B (r = -0.4109, p = 0.008), zone C ( r = -0.5116, p = 0.001, quadrant 3 (r = -0.3753, p = 0.017) quadrant 4 (r = 0.3758, p = 0.017) In addition, most of the positive correlation was demonstrated, among others: between the total water content in the body (%) and the general stability index (r = 0.3909 p = 0.013), the stability index a / p (r = 0.3142, p = 0.048), the stability index m / l (r = 0.4757, p = 0.002), zone A ( r = -0.4077, p = 0.009), zone B (r = 0.3834, p = 0.015), zone C (r = 0.5227, p = 0.001, quadrant 3 (r = 0.3464, p = 0.029) quadrant 4 (r = - 0.3624, p = 0.022) All stability parameters postural related to the test performed in static mode. In the case of the Postural Stability Test in the dynamic mode, a positive correlation was demonstrated in most cases, among others: between the non-fat tissue mass (FFM) and the general stability index (r = 0.3260, p = 0.040) zone A (r = -0.4236, p = 0.006 ), zone B (r = 0.4054, p = 0.009), zone C (r = 0.3873, p = 0.014), zone D (r = 0.4190, p = 0.007). In addition, most of the positive correlation was demonstrated, among others: between muscle mass and the general stability index (r = 0.3300, p = 0.038) zone A (r = -0.4256, p = 0.006), zone B (r = 0.4072, p = 0.009), zone C (r = 0.3900, p = 0.013), zone D (r = 0.4200, p = 0.007)

**Discussion**

The method of bioelectrical impedance analysis (BIA) can control the fat fraction, which is important in the epidemiology of many diseases, including breast cancer. Despite the fact that there are numerous studies, the etiology of breast cancer is not sufficiently explained. One of the important risk factors for breast cancer in addition to genetic conditions is poor nutrition and the associated deposition of adipose tissue. Obesity increases the risk of breast cancer, especially in postmenopausal women [15, 16, 20]. The results of their study showed the relationship between the parameters of the body composition indicators and postural stability. At the same time there are no reports of other researchers handling this problem, which undoubtedly requires deeper analysis for the application of additional clinical trials. Based on the research, a significant correlation was observed with a negative correlation in the Postural Stability Test, in static mode between fat mass and postural stability indexes. This means that the greater the fat mass, the lower the stability index, and vice versa. Also, statistically significant results of the positive correlation has been demonstrated in the same test between the content of total body water and the rates postural stability. Interpretation of the results indicates that the larger body water content, the higher the index of stability. Scoring women after mastectomy in this test depends on the number of deviations from the centre of the coordinate system, which means that the lower the score the better the postural stability. women after mastectomy were observed greater imbalance in the sagittal plane than in the frontal plane. Other scientific studies show that postural instability is most often associated with an increase in lateral body shifts [17]. Own research indicates that the observed decrease in the dynamics of upturns in the frontal plane may mean that obese women with an external prosthesis may have a more stable posture. Excessive weight combined with a greater distribution of fat, especially in the hips and thighs, necessitates an increased foot support width. This body structure can effectively limit lateral body rearing and minimize the risk of falling [14].

Given the mode of dynamic postural stability test showed a significant correlation between fat-free mass - FFM, muscle mass and overall stability index and time zones reside on the platform. An important role in maintaining a stable posture on wobbly ground is proper work of muscle groups. According to the motor control model, the central nervous system uses programmed motor reactions (strategies) and creates pathways that bind muscle groups into flexible and repetitive sequences. The use of muscle strategy simplifies the motor response of the nervous system to the sensory stimulus. These strategies are automatic responses that may change depending on environmental or biomechanical factors [18]. Three movement reactions in the anterior - posterior direction (sagittal plane) are distinguished: step and hip strategy as well as the step strategy [19]. Corbeil et al. studied the influence of body weight and fat distribution on posture stability undergoing external disorders. The authors concluded that obese people with abnormal amounts of abdominal fat may be more likely to fall than people with normal weight [21]. In obese women, deficits in the recovery of balance may result from different functional conditions of postural stability [22]. The cause may be slower response due to increased inertia of the body segments, increased joint stiffness and reduced mobility due to excessive fat tissue or muscle weakness or lack of coordinated movements [23, 17]. Maintaining proper proportions of body composition should be one of the basic preventive behaviors among women, especially after the age of 50 [24].

## Conclusions

1. Spearman's rank correlation showed a significant relationship between the postural stability indexes and the fat mass and the total water content in the body under static conditions.
2. Postural Stability Test in dynamic mode showed a significant effect of lean and muscle mass in maintaining a stable posture.
3. Standing posture of women after mastectomy were characterized by larger sublimations in the sagittal plane than the frontal one.

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Table 1. Descriptive statistics of the scales ANALYZED in the Postural Stability Test in static mode.

| ANALYZED scales | Mean | Standard deviation | Minimum | Lower QUARTILE | Median | Upper QUARTILE | Maximum |
|---|---|---|---|---|---|---|---|
| General stability index (static) | 1.11 | 0.94 | 0.30 | 0.50 | 0.75 | 1.50 | 4.80 |
| Stability index A / P (static) | 0.82 | 0.82 | 0.20 | 0.30 | 0.40 | 1.10 | 4.50 |
| Stability index M / L (static) | 0.51 | 0.47 | 0.10 | 0.20 | 0.30 | 0.53 | 2.30 |
| Zone A (%) | 96.90 | 8.61 | 55.00 | 99.00 | 100.00 | 100.00 | 100.00 |
| Zone B (%) | 2.85 | 8.24 | 0.00 | 0.00 | 0.00 | 1.00 | 44.00 |
| Zone C (%) | 0.23 | 0.66 | 0.00 | 0.00 | 0.00 | 0.00 | 3.00 |
| Zone D (%) | 0.03 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 |
| Quadrant 1 (%) | 19.70 | 18.50 | 0.00 | 6.00 | 13.50 | 29.50 | 71.00 |
| Quadrant 2 (%) | 9.08 | 9.04 | 0.00 | 3.00 | 6.00 | 14.00 | 34.00 |
| Quadrant 3 (%) | 26.88 | 22,49 | 0.00 | 8.50 | 23.00 | 41,50 | 81.00 |
| Quadrant 4 (%) | 44.35 | 23.32 | 7.00 | 25.50 | 47,00 | 57,00 | 92.00 |

Table 2. Descriptive statistics of the scales ANALYZED in the Postural Stability Test in dynamic mode.

| ANALYZED scales | Mean | Standard deviation | Minimum | Lower QUARTILE | Median | Upper QUARTILE | Maximum |
|---|---|---|---|---|---|---|---|
| General stability index (dynamic) | 1.81 | 0.84 | 0.80 | 1.30 | 1.60 | 2.00 | 5.20 |
| Stability index A / P (dynamic) | 1.40 | 0.80 | 0.40 | 0.90 | 1.20 | 1.55 | 4.30 |
| Stability index M / L (dynamic) | 0.87 | 0.40 | 0.40 | 0.60 | 0.75 | 1.20 | 2.20 |
| Zone A (%) | 97.75 | 6.16 | 65.00 | 98.00 | 100.00 | 100.00 | 100.00 |
| Zone B (%) | 1.45 | 4.08 | 0.00 | 0.00 | 0.00 | 1.00 | 24.00 |
| Zone C (%) | 0.58 | 1.60 | 0.00 | 0.00 | 0.00 | 0.00 | 7.00 |
| Zone D (%) | 0.23 | 0.80 | 0.00 | 0.00 | 0.00 | 0.00 | 4.00 |
| Quadrant 1 (%) | 22.55 | 25.93 | 0.00 | 3.00 | 13.50 | 29.00 | 98.00 |
| Quadrant 2 (%) | 23.38 | 26.70 | 0.00 | 5.00 | 10.00 | 34.50 | 100.00 |
| Quadrant 3 (%) | 28.80 | 24.96 | 0.00 | 7.00 | 24.50 | 48.50 | 88.00 |
| Quadrant 4 (%) | 25.28 | 21.84 | 0.00 | 4.50 | 22.00 | 39.50 | 87.00 |

Table 3.Characteristics of body composition.

| ANALYZED scales | Mean | Standard deviation | Minimum | Lower QUARTILE | Median | Upper QUARTILE | Maximum |
|---|---|---|---|---|---|---|---|
| Fat Mass (%) | 33.32 | 5.43 | 18.50 | 30.40 | 34.15 | 36.70 | 43.60 |
| Fat Mass (kg) | 23.88 | 6.50 | 8.70 | 19.75 | 24.55 | 27.90 | 41.90 |
| FFM | 46.70 | 4.90 | 37.00 | 43.85 | 47.25 | 49.60 | 57.70 |
| Muscle Mass (kg) | 44.30 | 4.67 | 35.10 | 41.35 | 44.85 | 47.10 | 54.80 |
| BMI | 27.53 | 3.84 | 19.70 | 25.60 | 26.95 | 29.15 | 38.50 |
| Total Body Water (kg) | 32.87 | 3.54 | 25.70 | 30.65 | 33.35 | 35.00 | 40.70 |
| Total Body Water (%) | 46.96 | 3.77 | 39.80 | 44.60 | 46.30 | 48.90 | 56.50 |

Table 4. Static postural stability in static mode and body composition.

| postural stability variables | Fat Mass (%) | Fat mass (kg) | FFM (kg) | Muscle mass (kg) | BMI | TBW (kg) | TBW (%) |
|---|---|---|---|---|---|---|---|
| Overall Stability index | **r = 0.417** | **r = -0.3447** | r = -0.113 | r = -0.1080 | r = -0.185 | r = -0.1272 | **r = 0.3909** |
| | **p = 0.007** | **p = 0.029** | p = 0.487 | p = 0.507 | p = 0.251 | p = 0.434 | **p = 0.013** |
| Anterior-Posterior Stability Inde x (°) | **r = -0.336** | r = -0.2478 | r = -0.006 | r = -0.0019 | r = -0.086 | r = -0.0213 | **r = 0.3142** |
| | **p = 0.034** | p = 0.123 | p = 0.970 | p = 0.991 | p = 0.596 | p = 0.896 | **p = 0.048** |
| Medial-Lateral Stability Index (°) | **r = -0.504** | **r = -0.4674** | r = -0.290 | r = -0.2848 | **r = -0.356** | r = -0.2983 | **r = 0.4757** |
| | **p = 0.001** | **p = 0.002** | p = 0.069 | p = 0.075 | **p = 0.024** | p = 0.062 | **p = 0.002** |
| Zone A (%) | **r**= 0.4328 | **r = 0.3452** | r = 0.0645 | r = 0.0617 | r = 0.1902 | r = 0.0816 | **r = -0.4077** |
| | **p = 0.005** | **p = 0.029** | p = 0.692 | p = 0.705 | p = 0.240 | p = 0.617 | **p = 0.009** |
| Zone B (%) | **r = -0.410** | **r = -0.3305** | r = -0.072 | r = -0.0695 | r = -0.175 | r = -0.0909 | **r = 0.3834** |
| | **p = 0.008** | **p = 0.037** | p = 0.657 | p = 0.670 | p = 0.278 | p = 0.577 | **p = 0.015** |
| Zone C (%) | **r = -0.511** | **r = -0.3823** | r = 0.0288 | r = 0.0291 | r = -0.280 | r = 0.0337 | **r = 0.5227** |
| | **p = 0.001** | **p = 0.015** | p = 0.860 | p = 0.858 | p = 0.080 | p = 0.836 | **p = 0.001** |
| Zone D (%) | r = -0.019 | r = 0.023 | r = 0.1425 | r = 0.1424 | r = -0.026 | r = 0.1526 | r = 0.0363 |
| | p = 0.910 | p = 0.889 | p = 0.380 | p = 0.381 | p = 0.872 | p = 0.347 | p = 0.824 |
| Quadrant 1 (%) | r = 0.0498 | r = 0.0444 | r = 0.1295 | r = 0.1297 | r = 0.0611 | r = 0.1360 | r = -0.0388 |
| | p = 0.760 | p = 0.786 | p = 0.426 | p = 0.425 | p = 0.708 | p = 0.403 | p = 0.812 |
| Quadrant 2 (%) | r = -0.137 | r = -0.1476 | r = 0.0068 | r = 0.0099 | r = -0.199 | r = 0.0193 | r = 0.1526 |
| | p = 0.398 | p = 0.364 | p = 0.967 | p = 0.952 | p = 0.218 | p = 0.906 | p = 0.347 |
| Quadrant 3 (%) | **r = -0.375** | r = -0.3050 | r = -0.113 | r = -0.1082 | r = -0.211 | r = -0.1279 | **r = 0.3464** |
| | **p = 0.017** | p = 0.056 | p = 0.487 | p = 0.506 | p = 0.190 | p = 0.432 | **p = 0.029** |
| Quadrant 4 (%) | **r = 0.3758** | **r = 0.3161** | r = 0.0036 | r = -0.0024 | r = 0.2328 | r = 0.0079 | **r = -0.362** |
| | **p = 0.017** | **p = 0.047** | p = 0.982 | p = 0.988 | p = 0.148 | p = 0.961 | **p = 0.022** |

Table. 5 Postural stability in dynamic mode and body composition.

| postural stability variables | Fat Mass (%) | Fat mass (kg) | FFM (kg) | Muscle mass (kg) | BMI | TBW (kg) | TBW (%) |
|---|---|---|---|---|---|---|---|
| Overall Stability index | r = -0.1469 | r = 0.0341 | **r = 0.3260** | **r = 0.3300** | r = 0.2016 | r = 0.3064 | r = 0.1286 |
| | p = 0.366 | p = 0.834 | **p = 0.040** | **p = 0.038** | p = 0.212 | p = 0.055 | p = 0.429 |
| Anterior-Posterior Stability Inde x (°) | r = -0.1931 | r = -0.0338 | r = 0.2799 | r = 0.2825 | r = 0.1131 | r = 0.2639 | r = 0.1833 |
| | p = 0.233 | p = 0.836 | p = 0.080 | p = 0.077 | p = 0.487 | p = 0.100 | p = 0.257 |
| Medial-Lateral Stability Index (°) | r = 0.1084 | r = 0.2357 | r = 0.2686 | r = 0.2745 | **r = 0.3458** | r = 0.2525 | r = -0.136 |
| | p = 0.505 | p = 0.143 | p = 0.094 | p = 0.087 | **p = 0.029** | p = 0.116 | p = 0.403 |
| Zone A (%) | r = 0.0634 | r = -0.1370 | **r =-0,423** | **r =-0.4256** | r = -0.272 | **r =-0,408** | r = -0.054 |
| | p = 0.698 | p = 0.399 | **p = 0.006** | **p = 0.006** | p = 0.089 | **p = 0.009** | p = 0.737 |
| Zone B (%) | r = -0.0776 | r = 0.1239 | **r = 0.4054** | **r = 0.4072** | r = 0.2599 | **r = 0.3903** | r = 0.0683 |
| | p = 0.634 | p = 0.446 | **p = 0.009** | **p = 0.009** | p = 0.105 | **p = 0.013** | p = 0.676 |
| Zone C (%) | r = -0.1112 | r = 0.0683 | **r = 0.3873** | **r = 0.3900** | r = 0.2308 | **r = 0.3682** | r = 0.0980 |
| | p = 0.495 | p = 0.675 | **p = 0.014** | **p = 0.013** | p = 0.152 | **p = 0.019** | p = 0.548 |
| Zone D (%) | r = 0.1299 | r = 0.2862 | **r = 0.4190** | **r = 0.4200** | r = 0.3075 | **r = 0.4171** | r = -0.122 |
| | p = 0.424 | p = 0.073 | **p = 0.007** | **p = 0.007** | p = 0.054 | **p = 0.007** | p = 0.452 |
| Quadrant 1 (%) | r = 0.1582 | r = 0.0916 | r = -0.044 | r = -0.0394 | r = 0.0684 | r = -0.0351 | r = -0.156 |
| | p = 0.329 | p = 0.574 | p = 0.787 | p = 0.809 | p = 0.675 | p = 0.830 | p = 0.335 |
| Quadrant 2 (%) | r = 0.0424 | r = 0.0149 | r = -0.025 | r = -0.0212 | r = 0.0057 | r = -0.0274 | r = -0.054 |
| | p = 0.795 | p = 0.927 | p = 0.877 | p = 0.897 | p = 0.972 | p = 0.866 | p = 0.740 |
| Quadrant 3 (%) | r = -0.2191 | r = -0.1472 | r = -0.039 | r = -0.0353 | r = -0.136 | r = -0.0370 | r = 0.2199 |
| | p = 0.174 | p = 0.365 | p = 0.807 | p = 0.829 | p = 0.401 | p = 0.821 | p = 0.173 |
| Quadrant 4 (%) | r = 0.0107 | r = 0.0413 | r = 0.1286 | r = 0.1131 | r = 0.0678 | r = 0.1176 | r = 0.0004 |
| | p = 0.948 | p = 0.800 | p = 0.429 | p = 0.487 | p = 0.678 | p = 0.470 | p = 0.998 |