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Body posture and the state of mood in women

Postura corporal e o estado de humor em mulheres

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Abstract — In the clinical practice of health professionals, it is observed that body posture can reveal the current emotional state. Emotional states can generate habitual gestures and postures that continue even after the emotion has ceased. The objective was to identify postural changes and variables found in the mood state in women. After project submission and approval to the CEP of the Lutheran University of Brazil (ULBRA), 15 women with a mean age of 39.6 years, regardless of color, race, or social class participated in the study. The sample was by convenience, being recruited through invitations on social networks. The research was carried out at the Walk Clinic of Exercise, in Charqueadas/RS. The instruments used were a sociodemographic and clinical questionnaire to characterize the sample, the Brunel Mood Scale (Brums), and the DIPA v13 (Digital Image based Postural Assessment) to assess posture. The results were presented in the form of descriptive statistics. It was found that increased tension and mental confusion for women with head changes in the sagittal plane and who also showed decreased vigor. In this study, it was verified that for women with low vigor, there is head alteration and that they present tension and mental confusion. More studies should be carried out with different methodologies in larger samples to enable the mapping and delineation of most postural changes related to emotional states and mood disorders, with due application in the clinical practice of health professionals.

Key words: Emotions; Women; Posture.

Resumo – *Estados emocionais podem gerar gestos e posturas habituais que continuam mesmo após a emoção ter cessado. O objetivo foi identificar os estados de humor e alterações posturais em mulheres. Estudo descritivo transversal. Participaram 15 mulheres com média de idade de 39,6 anos. Os instrumentos utilizados foram um questionário sociodemográfico e clínico para a caracterização da amostra, Escala de Humor de Brunel (Brums) e o DIPA v13 (Digital Image based Postural Assesment) para avaliação da postura. Os resultados foram apresentados na forma de estatística descritiva. Foi encontrado que mulheres com aumento da tensão e da confusão mental apresentaram alteração na posição sagital da cabeça. O vigor foi maior em mulheres com a posição da cabeça neutra. Neste estudo foi verificado que mulheres com baixo vigor apresentaram alteração da postura da cabeça, o que está associado a sintomas de tensão e confusão mental. É importante realizar mais pesquisas utilizando diferentes metodologias, a fim de mapear as alterações posturais relacionadas a estados emocionais e transtornos de humor. Esses resultados serão fundamentais para a aplicação clínica adequada por profissionais de saúde.*

Palavras-chave: *Emoções; Mulheres; Postura.*

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INTRODUCTION

The emphasis placed on the body in the 21st century causes many people to prioritize an aesthetically beautiful and healthy body, within the aesthetic and functional standards that dictate what is correct to raise their self-esteem, improve their quality of life and have a happy life. However, having a body within these standards includes not only perfect and proportional body contours, but also good body posture, which can still guarantee or recover the proper functioning of the body, combining self-care and health[1].

Posture can be defined as the position of the body in space, as well as the direct relationship of its parts to the center of gravity line. For us to have a correct posture, an integrity of the neuromusculoskeletal system is necessary. Everyone presents unique characteristics of posture that are influenced by several factors such as genetics, pathologies, psychological disorders and environmental conditions[2].

In human physiology, the body is the result of a multiplicity of elements involving both genetics and psychological, behavioral, and social factors and has a language that needs to be observed and decoded[3]. For psychological factors, it is important to know that emotions are strongly expressed by the human body and the ability to recognize emotions from body posture or movement is still developing during childhood and adolescence[4]. In addition, posture has been related to emotions and how they are affected. Retracted or stooped posture has been linked to negative health outcomes such as pain, depression, and overall stress ratings, as well as declines in overall health, emotional well-being, and energy/fatigue levels[5]. Pain, for example, can be communicated nonverbally through facial expressions, vocalizations, and body movements. A set of stimuli from body postures can communicate pain and basic emotions[6]. Incorporation theories suggest a reciprocal relationship between body expression and the way emotions are processed, and there may be a specific pattern for performing specific movements, such as walking, in individuals with dysphoric mood[7].

In fact, studies have shown that elevated muscle tension appears to be a consistent physiological finding related to anxiety[8]. The permanent state of muscle contraction may predispose to muscle shortening, expressed in body posture in the form of deviations. Regarding anxiety, a study identified an association between anxiety and postural changes[9]. Anxiety and depression are expressed in body posture, through the shortening of the soleus muscle, leading to increased tibiotarsal angle and knee hyperextension[10]. Posture may be linked to fightorflight behavior in the face of a threatening situation, since it was also found that trait anxiety was associated with greater posterior inclination of the body and less anteroposterior asymmetry of the body, which may suggest an association of anxiety with shortening of the Posterior Surface Line[11].

Women undergo hormonal changes throughout life constantly causing physical, psychological, and social changes, compromising the relationship, and affecting productivity in the family, social, school, and professional environment[12]. Thus, considering that posture can bring meanings to emotions or vice versa, and can be attributed to the various forms of communication of the human body, this study aimed to identify states of mood and postural changes in women.

METHOD

Descriptive, cross-sectional, and quantitative study. The sample consisted of 15 female participants, living in the municipality of Chaqueadas/RS, selected by convenience. The selection took place through invitations made by the researcher on her social networks. The participants were aged between 25 and 50 years and were chosen regardless of color, race or social class. Inclusion in the study was made for sedentary women without neurological impairment. Exclusion criteria were surgical history or musculoskeletal injuries in the last 6 months, pregnancy, or menopause/climacteric status. Data collection was performed between May and October 2021.

To characterize the sample, a sociodemographic and clinical questionnaire composed of 15 questions was applied, with data on age, education, date of birth, marital status, profession, monthly family income, use of medications, associated pathologies, surgical intervention, and level of physical activity. To identify states of mood, the instrument used was the Escala de Humor Brasileira (Brazil Mood Scale), which is the Brazilian version of the Brunel Mood Scale (BRUMS)[13]. The instrument contains 24 mood indicators and Likert-type response scale for each of the items, being: 0 - nothing, 1 - little, 2 - moderately, 3 - a lot, and 4 - extremely. The question used was "how do you feel now?". The twenty-four scale items make up six subscales: anger, mental confusion, depression, fatigue, tension, and vigor. This division is part of the intrinsic construct of the instrument and is not explicit to the research participants. Each of the subscales contains four items and the sum of the answers presents a score that can vary from 0 to 16 points. For postural assessment, the DIPA (Digital Image-based Postural Assessment) was used, a free postural assessment software that uses photogrammetry to assess the posture of the body segments, in the sagittal and frontal planes. The DIPA provides quantitative information on the posture of individuals, in addition to a postural clinical diagnosis. Each assessment plan is assessed separately (Frontal and Sagittal) and the markers were reused from one plan to another in accordance with the protocol.

Individually, as soon as the participant arrived at the *Walk Clínica do Exercício*, she signed the ICF and answered the sociodemographic and clinical questionnaire. After answering the Brunel Mood Scale, the participant went to the room where the DIPA v13 photographic record was taken. This room was at room temperature, with the necessary materials for the acquisition of the posture image collected in the right profile and on the back, after placing each marker. In the assessment in the sagittal plane, the photographic record was of the right profile of the subject (Figure 1A) with 23 anatomical reference points marked with Styrofoam balls: occipital protuberance (C0), posterior tubercle of atlases (C1), spinous processes of the vertebrae C2, C4, C6, C7, T1, T2, T4, T6, T8, T10, T12, L2, L4, S2, right tragus (RT), right acromis (RA), right postero-superior iliac spine (RPSI), right anterior-superior iliac spine (RIAS), greater trochanter of the right femur (FMT), tuberosity of the lateral condyle of the right femur (RLFCT) and right lateral malleolus (RMLD). For the photographic recording of the back (Figure 1B), 21 reference points were obligatorily marked: right (RA) and left (LA) acromion, trigonum spinae of the right (RRSS) and left (LLSS) scapula, inferior angle of the right (RLSS) and left (LLSS) scapula, superior right (ISPSD) and left (ISPSE) iliac spine, tuberosity of the right (RL) and left (CE) calcaneus, occipital protuberance (C0) and spinous processes of the vertebrae: C7, T2, T4, T6, T8, T10, T12, L2, L4 and S2.

In the assessment in the sagittal plane, the photographic record was of the right profile of the assessed. For head position results, the marked points were: occipital protuberance (C0), posterior tubercle of atlas (C1), spinous processes of vertebrae C2, C4, C6, C7, right tragus (RD), and right acromion (RD) (Figure 2). After the body markings were completed, the volunteer was positioned next to the plumb line to capture the images in the sagittal and frontal planes. This process took around 30 minutes for each participant. For the preparation of the room, the camera was resting on the tripod, 2.80 m away from the individual and with a height of 0.95 m. The plumb line was 1.05 m away from the back wall, so that its depth coincided with the depth of the lateral malleolus (in the profile register) and the heels (in the back register). All instruments and body markings of DIPA v.1.3 were performed by the physiotherapist author of this research.

Data analysis of each instrument was performed by observing the description of the data based on the highest score for the BRUMS variables and identifying the altered postural variable in the DIPA analysis. Data were tabulated using Microsoft Excel and results were presented using descriptive statistics. Quantitative variables were described by mean and standard deviation or median and interquartile range. Categorical variables are described by absolute and relative frequencies. To compare medians, Mann-Whitney or Kruskal-Wallis tests were used. The association between variables was assessed by Spearman's correlation test. The significance level adopted was 5% and the analyses were performed using the SPSS software version 21.0. It is important to highlight that, in this study, the classification of the head position in the image of the right profile, in the sagittal plane, was defined as follows by the DIPA software: neutral head (angle between 50° and 60°), posteriorization of the head (angle >60°) and anteriorization of the head (angle <50°). For data analysis, two categories of head position were considered: neutral and altered (posteriorization or anteriorization). This was because the DIPA software presents specific points that result in great sensitivity, which can make it difficult to correlate the information with an instrument such as the Brunel Mood Scale (BRUMS)[13], which seeks to quantify subjective variables.

The project was approved by the Ethics Committee of the Lutheran University of Brazil (CAAE 44565121.3.0000.5349). All protective measures against COVID-19 were taken, such as the use of masks and alcohol gel, both by the participants and the examiner.

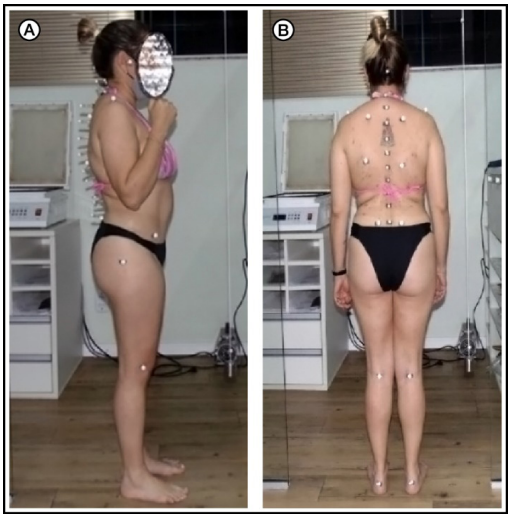

Figure 1. Image acquisition in the sagittal plane right profile and frontal plane facing away from the DIPA.

Figure 2. Image acquisition for cervical angles for DIPA software.

RESULTS

Table 1 displays the description of the sample, where the mean age was 39.6 years. Regarding anthropometric indicators, the mean Body Mass Index (BMI) was 24.7 kg/m2, indicating that the participants were within the normal weight range, according to the parameters established by the World Health Organization (WHO)[14].

Table 1. Characterization of the sample of women participating in the study.

Variables	(n=15)
Age (years)[1]	39.6 ± 9.7
Weight (kg)[1]	64.5 ± 9.9
Height (m)[1]	1.62 (0.06)
BMI (kg/m2)[1]	24.7 ± 3.8
Income[2]	
<2 s.m.	2 (13.3)
2 to 4 s.m.	3 (20.0)
4.1 to 6 s.m.	3 (20.0)
>6 s.m.	7 (46.7)
Education[2]	
Elementary school	5 (33.3)
High school	5 (33.3)
College	5 (33.3)
Marital Status[2]	
Single	5 (33.3)
Married	7 (46.7)
Divorced	3 (20.0)

Note. [1]mean ± SD (Standard Deviation). [2]n(%)

Table 2 shows the results of the Brunel Mood Scale (BRUMS). It can be seen that vigor, fatigue, and tension have a higher average than the other variables.

Table 2. Results of the BRUNEL Mood Scale (BRUMS)[13].

Factors	Variation of scale	Mean ± SD[1]	Median (P25-P75)	Min-Max[2]
Tension	0-16	5.27 ± 3.86	5 (2-8)	0-13
Depression	0-16	2.00 ± 2.75	1 (0-3)	0-9
Anger	0-16	1.40 ± 2.35	0 (0-4)	0-7
Vigor	0-16	6.40 ± 2.82	7 (4-9)	1-11
Fatigue	0-16	5.80 ± 3.78	8 (2-9)	0-10
Mental Confusion	0-16	3.40 ± 3.78	2 (1-4)	0-12

Note. [1]SD: Standard Deviation. [2]Min-Max: minimum and maximum values.

The results obtained in the BRUMS Scale and the postural classifications provided by the DIPA v13 software were coded and presented in Table 3. An increase in tension and mental confusion was observed in women who presented changes in the sagittal position of the head ($p<0.05$). On the other hand, women with a neutral head position demonstrated greater vigor ($p<0.05$). In other words, there was a tendency for women with mental tension and confusion to present changes in the sagittal position of the head, while vigor was associated with a neutral sagittal position of the head. In the postural assessment of the knees, pelvis, scapula and trunk, no changes were identified.

Table 3. Association of sagittal head position with the BRUNEL Mood Scale (BRUMS)[13].

BRUMS	Neutral sagittal head (n=9)	Altered sagittal head (n=6)	p
	Median (Min-Max)	Median (Min-Max)	
Tension	**3 (0-8)**	**8 (2-13)**	**0.026**
Depression	0 (0-3)	3.5 (0-9)	0.181
Anger	0 (0-4)	0 (0-7)	0.776
Vigor	**8 (5-11)**	**3.5 (1-7)**	**0.005**
Fatigue	7 (0-9)	8.5 (3-10)	0.224
Mental Confusion	**1 (0-8)**	**4 (1-12)**	**0.050**

Note. n: sample number. Min-Max: minimum and maximum values.

DISCUSSION

In the context of the objective of this study, which was to identify postural changes and variables related to mood in women, an increase in mental tension and confusion was observed when there was a change in the sagittal position of the head. These results are in line with studies that explored the connection between emotions and body posture, investigating various types of emotions and their aspects in non-verbal communication. The human body interprets sensory information from both the internal and external environment, and it is necessary to understand the interrelationship between the senses to facilitate this sensory interpretation. Rarely does a person have a unified perception of the world around them, as sensory signals provide references for body representation. The shape, proportion, posture, and body movement can be influenced by various sensory systems and affect the perception we have of our own body, contributing to the emotional experience. Different emotions have distinct effects on body posture[15]. When relating subjective emotions to posture in healthy women, the relationship between the Thales angle (inclination of the head) and feelings of worry and anger stands out, as well as the changes in the head and neck associated with sadness and depression[16].

Regarding mood, the participants in this study presented high levels of vigor, moderate levels of tension, fatigue, and mental confusion, and low levels of depression and anger. This configuration of results is commonly referred to as the "iceberg profile", characterized by an increase in the vigor factor in relation to other emotional factors[13]. This same profile was identified in volleyball athletes, indicating that the state of mood profile may be an intervening factor in motor performance[17]. Similarly, in winning tennis players, the "iceberg profile" was also observed, indicating that the combination of high self-confidence and low levels of anxiety helped them to remain calm and relaxed under pressure, making them less susceptible to the negative effects of events[18]. In this study, vigor was associated with neutral head position in women ($p<0.05$).

When associating states of mood and body changes measured by DIPA, associations were found between tension and mental confusion and changes in the head in the sagittal plane, suggesting a connection between emotional instability and mental confusion ($p<0.05$). These same changes in head posture were identified in individuals who underwent treatment for depression, in which an increase in head flexion and thoracic kyphosis was observed. Depressive individuals tend to experience significant changes in posture and manifest mild dissatisfaction with body image[19]. A study of marathon runners indicated that the group with depressed mood had significantly higher scores on anger, confusion, fatigue, tension with lower vigor, and perceived readiness. These results withstand the idea that emotional state and levels of vigor are related to body posture and can influence how we feel and behave[20].

Expansive postures are associated with increased subjective feelings of power, while contractive postures can lead to negative distortions, such as low confidence, feelings of failure, and depressive thoughts[21]. Adopting an upright posture was associated with improved self-esteem and mood in healthy individuals, while in people with mild to moderate depression the shift to an upright posture resulted in reduced negative affect and fatigue. In addition, the shoulder angle was associated with less negative affect and anxiety in groups that maintained a more upright posture, suggesting an important reduction in fatigue[22]. Depressed patients in curved posture remembered more negative than positive words, while patients in upright posture had a balanced memory of negative and positive words. This result is not only attributable to a reduction in the memory of negative words in an upright posture, as the upright posture actually "balances" the difference between negative and positive words[23]. The influence of upright and curved sitting postures on affective and cardiovascular responses during a psychological stress task were investigated. The authors concluded that adopting an upright sitting posture during stressful events can promote the maintenance of self-esteem, reduce negative mood, and increase positive mood, in addition to increasing speech speed and reducing self-focus, making it a simple behavioral strategy to help build resilience to stress[24]. These studies highlight the importance of body posture in influencing emotions and cognitive processing. The findings suggest that adopting an upright posture may positively affect emotional state and stress response, while curved postures are associated with negative emotions.

In the present study, it was observed that the means of anger and depression were the ones that presented the lowest means in women, which may explain the absence of association between these emotions and changes in the pelvis and shoulder blades, as reported in other studies. Anger may be related to shoulder strain[25], while depressive symptoms have been associated with poor posture, including abnormal spinal curvatures and episodes of low back pain[19,26]. In addition, one study identified an association between subjective expression of anger and chronic low back pain[27].

Despite the small sample size, due to the Covid-19 pandemic, the results found are relevant. These findings are of great clinical relevance when considering the risk factors for changes in the neck and upper limbs, which are influenced by several factors, both physical and psychosocial. The interaction of these factors can be mutually reinforcing, and their influence can also be mediated by cultural or social issues. It is currently recognized that psychosocial characteristics play a crucial role as risk factors for cervical-related signs and symptoms.

However, it is important that future studies further explore these behavioral aspects to better understand the impact of psychosocial variables on physical conditions related to the neck and upper limbs.

CONCLUSION

In this study, it was observed that women with low vigor presented changes in head posture, which was related to symptoms of tension and mental confusion. These findings highlight the importance of conducting additional research using different methodologies to comprehensively map the postural changes associated with emotional states and mood disorders. These results will be instrumental in enabling appropriate clinical application by healthcare professionals, providing a more comprehensive understanding of the interactions between emotional state and body posture.

COMPLIANCE WITH ETHICAL STANDARDS

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Ethical approval

Ethical approval was obtained from the local Human Research Ethics Committee – Universidade Luterana do Brasil (CAAE 44565121.3.0000.5349), and the protocol was written following the standards set by the Declaration of Helsinki.

Conflict of interest statement

The authors have no conflict of interests to declare.

Author Contributions

Conception and design of the study: MMS, AMPVS, GAA; Data collection: MMS; Analyzed the data: MMS, AMPVS, GAA; Writing of the manuscript: MMS, AMPVS, GAA; Critical revision of the text: MMS, AMPVS, GAA.

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