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Effects of Yoga Practice on Personality, Body Image and Lactate. Pilot Study on a Group of Women from 40 Years

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Abstract: Yoga techniques are increasingly popular all over the world. This discipline provides benefits both in relation to particular psychological disorders, such as anxiety disorders or those related to stress, but also in relation to certain clinical frameworks that involve significant life changes of people. Some studies have shown that this practice brings relevant benefits regarding cognitive functions such as memory and attention. The aim of this study was to verify, in women over 40 years of age, whether the practice of yoga can positively affect self-esteem, anxiety control, and body image. It was also intended to verify whether the potential beneficial effects of yoga are influenced by the personality's profile of the individual who practices it. Results demonstrated comparable data on a high level of well-being and psychophysical balance for all samples involved. These results, therefore, confirm that the constantly practiced yogic technique affects the lifestyle of the subject by promoting the learning of effective methods for physical health and well-being.

Keywords: yoga; body image; lactate; women

1. Introduction

Health and well-being play an important role in human life. Every day, both individuals, society, and the scientific world struggle to ensure that they are respected and, day after day, this becomes more important. The World Health Organization [1] defined health as "A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity".

A similar thought is found in Ottawa Charter for Health Promotion [2] when it states "To reach a state of complete physical, mental and social well-being, an individual or group must be able to identify and to realize aspirations, to satisfy needs, and to change or cope with the environment".

The aging process involves a series of changes that include the relationship of each of us with ourselves [3]. This leads to a worsening of one's self-esteem [4] and increasing difficulties in anxiety

control [5–8]. A recent study suggests that becoming elderly also have a negative effect on women's body image [9]. The term body image defines a multidimensional construct composed of thoughts, emotions, perceptions, and evaluations related to one's own body [10,11].

It is believed that relaxation techniques in general, and the practice of yoga in particular, are able to reduce an individual's anxiety load, making their relationship with themself better.

The word yoga is a Sanskrit term that derives from the root with the meaning of "to attach, join, harness, yoke" [12].

The basic principles of "yoga", despite some variations over time, are (a) a meditative instrument to free oneself from suffering and achieve inner peace and salvation, (b) the expansion of consciousness so as to be able to understand everyone and everything, and (c) a path to enlightened consciousness that allows one to understand both illusory and true reality.

In recent decades, the practice of yoga has spread widely in western nations and the number of practitioners is growing rapidly. Various studies confirm that people who habitually practice yoga learn to know themselves, to understand the beauty of their Self, and at the same time they learn to accept the fears, insecurities, and uncertainties that life presents, learning to face and overcome them [13–16]. Among the numerous benefits induced by the practice of yoga [17], we must include stress reduction [18], depression [19], fatigue [20], and post-traumatic stress disorder [21].

The aim of this study was to verify, in women over 40 years of age, whether the practice of yoga can positively affect self-esteem, anxiety control, and body image. It was also intended to verify whether the potential beneficial effects of yoga are influenced by the personality profile of the individual who practices it.

Moreover, since it has been observed that the continuous practice of yoga improves the body's physiological response to exercise [22,23], we have also measured the blood lactate levels both at rest and at the end of the yoga session. The aim was to verify whether the practice of yoga progressively reduces blood lactate levels both at rest and at the end of the training session.

2. Materials and Methods

2.1. Participants

Fifty-four women over 40 have agreed to participate in the study. Twenty-seven healthy adult women practicing yoga, aged between 40 and 62 years (mean ± standard deviation (SD), 55.07 years ± 5.43], formed the Study Group. All participants attended, no less than twice a week, at a qualified center, courses of Ashtanga Vinyasa Yoga, a modern-day form of classical Indian Yoga. The style is energetic, synchronizing breath with movements. The individual poses (asanas) are linked by flowing movements (vinyasas). The intensity of an exercise could be expressed in terms of metabolic equivalents (METs): an activity below 3 METs is considered to be of low intensity, between 3 and 6 METS is moderate-intensity and, finally, if it exceeds 6 METS, it is high intensity [24]. The intensity of Ashtanga Vinyasa Yoga sessions was quantified between 3 and 6 METs, i.e., moderate [25].

All the women of Study Group practiced yoga from a minimum of 1 year to a maximum of 34 years (mean 8.74 years ± 7.51). The Control Group was represented by a group of 27 women with similar age (means 54.15 years ± 4.79) who were exercising twice a week on treadmills at a moderate intensity (between 3 and 6 METs). The women forming the control group practiced on treadmills from a minimum of 1 year to a maximum of 14 years (mean 5.41 years ± 3.09). All participants signed an informed consent on the methods and purposes of the research, built on the basis of the Declaration of Helsinki.

2.2. Study Design

In order to highlight the possible role of yoga, the women who participated in the study were divided into two groups: one consisted of women who regularly practiced yoga (Study Group) and the other of women who habitually went to the gym but had never practiced yoga (Control Group).

In the present study, the personality's aspects of the participants have been evaluated through the Big Five Questionnaire-2 (BFQ-2) [26], a test built on the basis of the Big Five Theory [27,28]. BFQ-2 also includes, through a lie scale, the evaluation of social desirability [26], i.e., the tendency of an individual to give answers in order to produce the best possible image of themself [29].

The amount of dissatisfaction of body image was measured by using the Silhouette-Figure Rating (SFR) scale [30]. This scale represents an evident measure of how an individual identifies his or her own physical appearance.

Self-esteem was assessed with the Basic Self-Esteem (Basic SE) scale, a rating scale that aims to measure basic self-esteem [31].

The amount of anxiety was assessed using the State-Trait Anxiety Inventory Form Y (STAI-Y) [32].

We correlated the levels of blood lactate both with the age of the subject and with the number of years of yoga practice. For comparison, the same measurements were also made on the Control Group where the number of years of yoga was replaced by the number of years of gym practice.

2.3. Silhouette Figure Body Image

The test involves the use of stylized images or silhouettes. Subjects are asked to choose between stylized images, ranging from extreme thinness to extreme obesity, the one that is closest to their physical structure and the one they would like to have. The difference between the two is an indication of the degree of dissatisfaction towards one's body [33].

2.4. Big Five Questionnaire-2 (BFQ-2)

The Italian version of the BFQ-2 questionnaire has been used [26]. BFQ-2 assesses personality traits divided into 5 major factors, each of which are divided into two sub-dimensions: Openness (inventive/curious vs. consistent/cautious), Conscientiousness (efficient/organized vs. easy-going/careless), Energy (or extraversion; outgoing/energetic vs. solitary/reserved), Agreeableness (friendly/compassionate vs. analytical/detached), Emotional stability (or neuroticism; sensitive/nervous vs. secure/confident) [34]. A sixth variable, called lie scale, has been added to the BFQ-2. This scale, consisting of two sub-dimensions (lie egoistic + lie moralistic) measures the participant's tendency to provide a false profile of him/herself [34]. Variables are evaluated on a 5-point Likert scale ranging from 1 (absolutely false) to 5 (absolutely true).

2.5. State-Trait Anxiety Inventory-Y (STAI-Y)

STAI measures anxiety in its two main forms: "State anxiety, or anxiety about an event; and Trait anxiety, or anxiety level as a personal characteristic. The Y version of the STAI was used in this study based on a 4-point Likert scale, 1 (not at all) to 4 (extremely), and consists of 40 questions on a self-report basis" [32,34].

2.6. Basic SE Basic Self-Esteem Scale

Self-esteem was assessed through the Italian version of the Basic SE scale [35]. It is an evaluation scale that measures basic self-esteem, i.e., the sense of self-esteem that is formed during childhood and consolidates stable personality characteristics in adults, regardless of external conditions.

2.7. Blood Lactate

Blood lactate levels were quantified before as well as at the end of the yoga session or gym session, by using a "Lactate Pro 2" portable lactate analyzer (Arkray Inc., Tokyo, Japan), as this lactate analyzer has proven to be highly reliable [36].

2.8. Data Analysis

The data collected were averaged and then compared using the non-parametric Mann-Whitney test. Linear regression and Pearson's correlation coefficients were also evaluated. Statistical significance

was set at $p < 0.05$. All descriptive statistics are reported as mean ± SD. Comparison between correlations was carried out by transforming the correlation coefficient values, or r values, into z scores (Fisher's r to z transformation; [32,37]), by using the formula: z observed = (z1 − z2)/(square root of [(1/N1 − 3) + (1/N2 − 3)], where the z values (z1 and z2) correspond to the correlation coefficients (r). Analyses were carried out using GraphPad Prism version 6.3 for Windows (GraphPad Software, Inc., La Jolla, CA, USA) [38].

3. Results

Figure 1 summarizes the main results obtained in the present study. As can be seen, no difference between the Study Group and the Control Group has been highlighted for any of the studied variables.

Both groups were then studied. The possible correlations between the age of the participants and the studied variables were analyzed, i.e., personality, self-esteem, anxiety control, and body image. For both groups, none of these variables revealed a statistically significant relationship with age, as has been highlighted (data not shown).

The possible relationship between the studied variables with the number of years of yoga practice (Study Group) or the number of years of attendance at the gym (Control Group) by the subjects was then verified.

As can be seen in Figure 2, significant negative correlations have been found between the number of years of yoga practice with both the degree of dissatisfaction with one's body image and the level of anxiety. However, a significant positive correlation between the number of years of yoga practice and self-esteem has been found.

As can be seen in Figure 3, a strong positive correlation was found between the two forms of anxiety in both groups of women.

No statistically significant correlation was found, in both groups, between years of yoga and personality profile defined by BFQ-2 (data not shown).

Figure 4 illustrates possible correlations of blood lactate levels, at rest and at the end of the session, with the number of years of yoga practiced by the subjects of the Study Group, or the number of years of gym practice of the subjects of the Control Group (upper part of the figure). As can be seen, a strong negative linear correlation between years of yoga and blood lactate levels, both at rest and at the end of the session, was observed in the Study Groups. A significant negative linear correlation was also observed in the Control Group only for the levels of blood lactate at the end of the session. In the lower part of the figure, there are shown the relation between blood lactate levels, at rest, and at the end of the session, with the age of subjects of the Study Group (left) and of the Control Group (right). It is possible to detect that in both groups no significant relation was observed between the age of subjects and blood lactate levels.

Fisher's r to z transformation of the data showed in Figure 4 revealed a statistically significant difference ($p > 0.05$) between the relations of blood lactate levels at rest and the number of years of yoga or gym practice in the Study Group or Control Group.

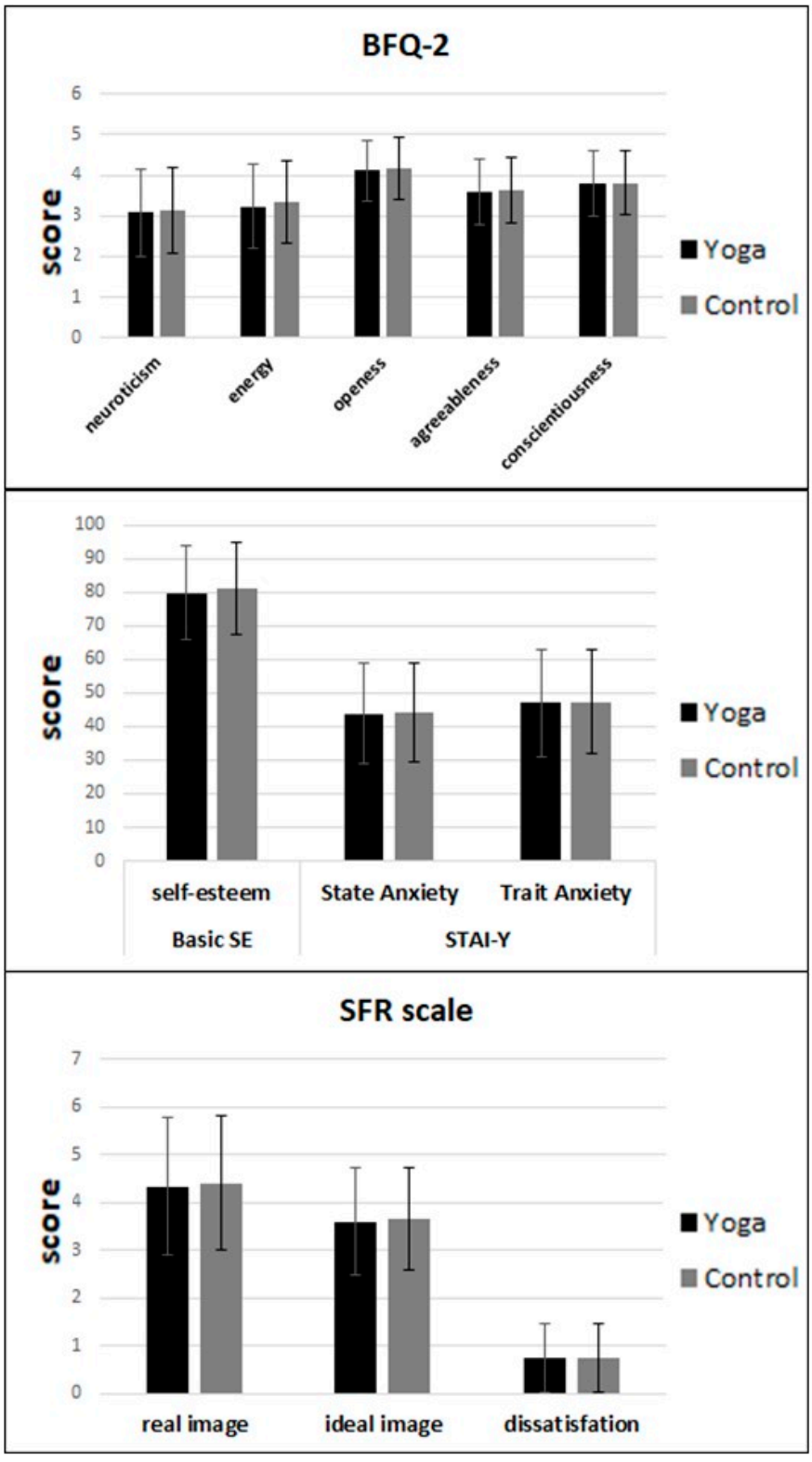

Figure 1. Mean values (±S.D.) of score obtained in the psychological tests to which the participants in the study were subjected. As can be seen, for all the examined variables no statistically significant difference was found between the women of the Study Group and those of the Control Group. Abbreviations: Basic SE: Basic Self-Esteem scale; BFQ-2: Big Five Questionnaire-2; SFR: Silhouette-Figure Rating scale; STAI-Y: State-Trait Anxiety Inventory Form Y.

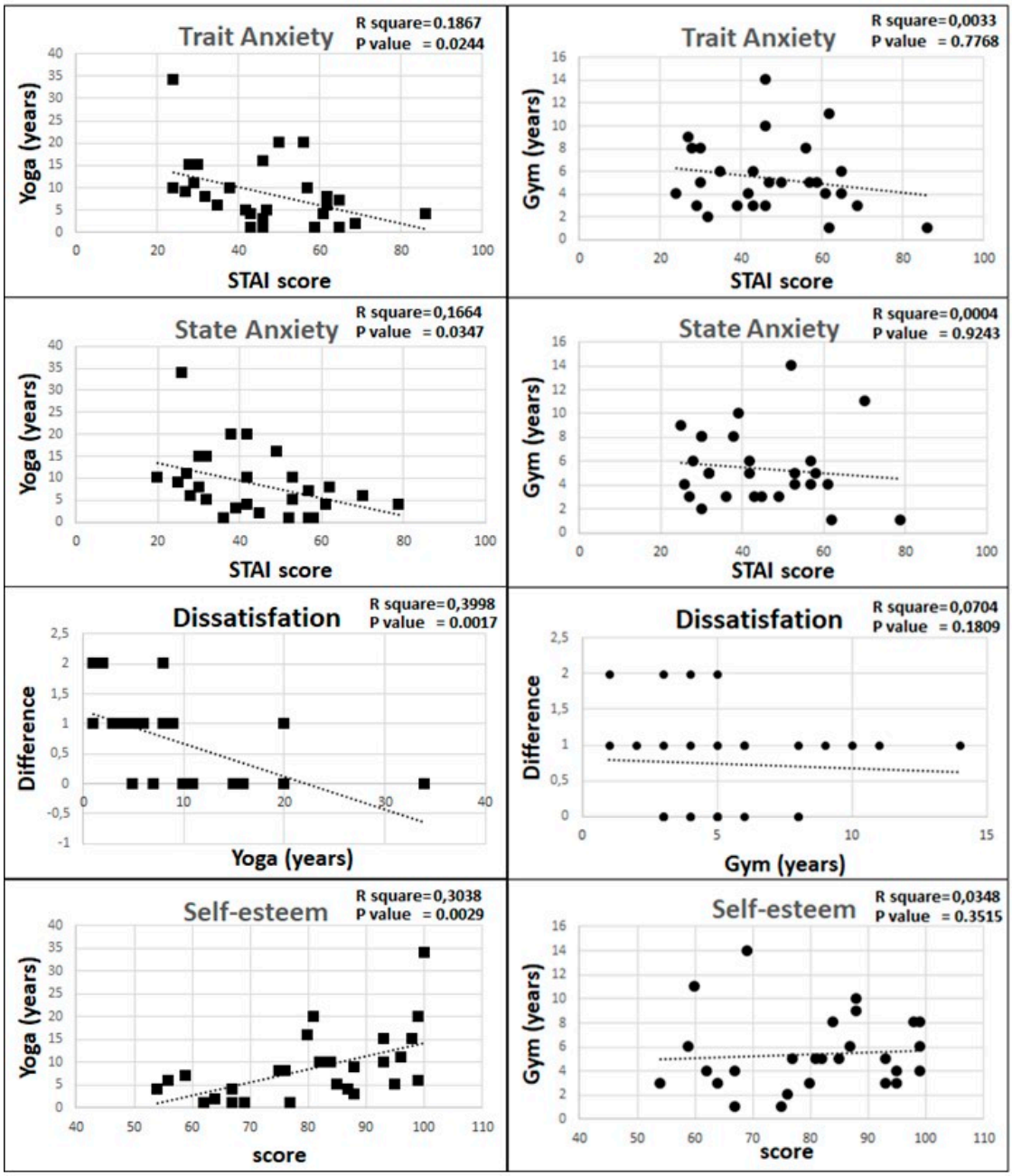

Figure 2. Correlation between years of yoga (**left**) or years of gym practice (**right**) and state anxiety, trait anxiety, dissatisfaction, and self-esteem. As can be seen, while all the four variables showed a significant correlation with the years of yoga, none of them were correlated to the years of gym practice. Abbreviations as in Figure 1.

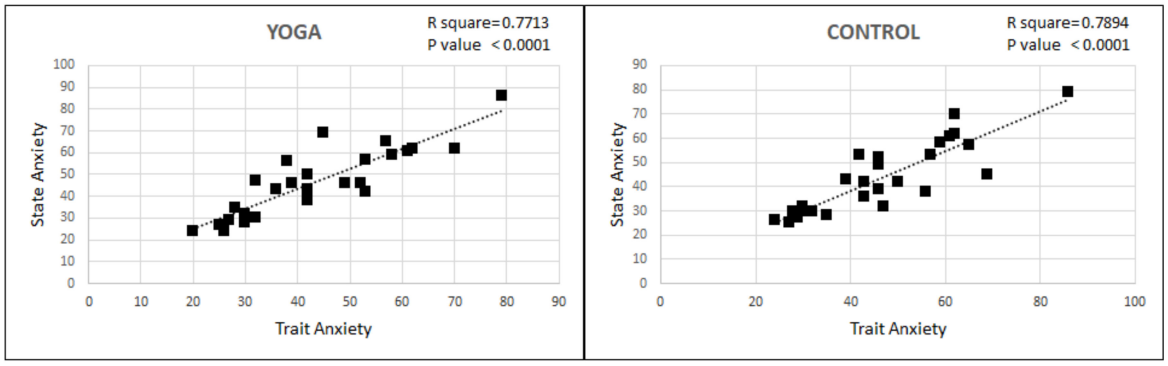

Figure 3. Correlation between state anxiety and trait anxiety in Study Group (**left**) and Control Group (**right**). It is possible to detect a strong positive linear correlation between these two variables in both Groups.

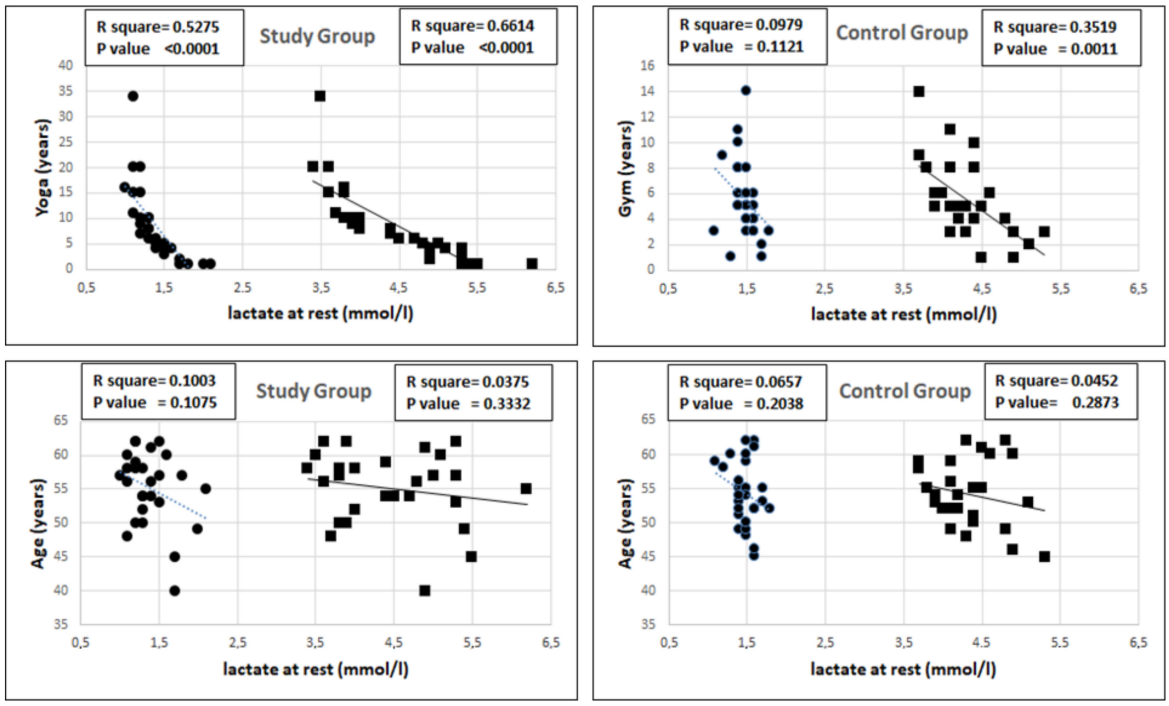

Figure 4. Correlation between blood lactate levels, at rest and at the end of the session, and the number of years of yoga and gym practice (upper part) of the age of subjects (lower part) in Study Group (**left**) and Control Group (**right**). It is possible to detect that in both groups no relation was observed between the age of subjects and blood lactate levels. On the other hand, a strong negative linear correlation between years of Yoga and blood lactate levels at rest and at the end of the session in the Study Groups. A significant negative linear correlation was observed in the Control Group only for the levels of blood lactate al the end of the session.

4. Discussion

The present study shows that the practice of yoga induces positive effects on the individual who practices it regularly.

Today, more than in the past, yoga techniques are widespread all over the world, although many people consider such techniques common physical exercises. There are in fact numerous differences.

It is scientifically proven that the practice of yoga allows individuals to obtain advantages in dealing with particular psychological disorders, such as anxiety disorders, stress disorders, etc.

It might be desirable to consider using yoga techniques also within a therapeutic context. Several studies [13–16,39–41] confirm that it is no longer sufficient to entrust the healing of the person to the exclusive administration of medication. There is increasing talk of integrated methods and how they represent the future of individual and community well-being. In addition to medication-based medicine, there is a need for approaches that help people to focus on the problem in question and to use their own resources to pursue a healing path that is efficient and, above all, permanent.

What each of us needs is to find time to dedicate to ourselves, to reach the concentration useful to reflect on what is happening daily and that can destabilize us, so as to correct the distorted vision of the surrounding reality that does not allow us to reach a stage of inner balance and harmony [42–47].

The practice of yoga, or at least a particular type of yoga such as Ashtanga Vinyasa Yoga, a modern-day form of classical Indian Yoga characterized by an energetic style, seems to be acting dose-dependently.

It is, of course, possible that the effects observed can be traced back to the meditative aspects of yoga, even though it should be noted that the type of yoga practiced has a significant amount of motor activity (600 to < 3000 MET-min/week), quantifiable as moderate activity [24].

In previous studies, a positive influence of regular moderate physical activity had been described on anxiety [48–50] and self-esteem [51]. In the present study, however, this correlation was not found in the Control Group. A possible explanation could lie in the fact that type, intensity, and frequency of physical activity practiced by these women is only deduced from their statements.

Finally, the present study has confirmed that the practice of yoga improves the physiological response of the body to physical exercise [22,23,52], as blood lactate levels, both at rest and at the end of the session, are significantly reduced with the number of years of practice. Since in the Control Group no correlation between the blood lactate values at rest and the number of years of gymnastics practiced by the subjects has been detected, it must be concluded that the effect detected must be considered a specific consequence of yoga practice.

The main strength of this study is the high number of participants, while a weakness is the difficulty in quantifying the intensity with which each participant performed the exercise.

5. Conclusions

This study has shown that the practice of yoga can positively influence the self-esteem, anxiety, and body image of a group of women over 40 years of age.

These positive effects of yoga manifest themselves independently of the personality profile indicated by BFQ-2 and by the age of the woman.

The practice of yoga also improves the body's physiological responses to physical exercise.

This leads to the belief that yoga could be considered a useful tool to antagonize the negative effects that the aging process exerts on anxiety, self-esteem, body image, and physical efficiency.

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