Experimental

Effect of Asanas, Meditation and Pranayama on Physiological and Psychological Variables of College-level Students

Debajyoti Acharyya, Professor Dr. Srikanta Mishra

1Research Scholar, Department of Physical Education, Fakir Mohon University
2HOD Department of Physical Education, Baliapal College of Physical Education, Baliapal, Odisha

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ABSTRACT

Introduction:
The objective of this study was to find out the influence of Yogasana, Meditation and Pranayama practice on the Physiological and Psychological variables of College-level Students, Psychological fitness — or mental health — can be measured by assessing levels of anxiety, depression, stress, self-esteem, satisfaction, positive relationships, responsibility and competence. A person with high anxiety levels and poor relationships is not as psychologically fit as someone with low anxiety levels and rich relationships. And like “workouts” that improve physical fitness, there are exercises that improve psychological fitness. The definition of health-related fitness involves exercise activities that you do to try to improve your physical health and stay healthy, particularly in the categories of cardiovascular endurance, muscular strength, flexibility, muscular endurance and body composition. Yoga is a holistic science of universal applicability and adaptability. Although originated in India, Yoga and meditation are being practiced throughout the world. The rather consistent and wide range of benefits and applications of yoga and meditation led numerous multi-disciplinary researchers to conduct research in these areas. An “Asana” is a body posture, originally and still a general term for a sitting meditation pose, and later extended in hatha yoga and modern yoga as exercise, to any type of position, adding reclining, standing, inverted, twisting, and balancing poses. “Pranayama” is control of Breath”. “Prana” is Breath or vital energy in the body. On subtle levels prana represents the pranic energy responsible for life or life force, and “ayama” means control. So Pranayama is “Control of Breath”.

Materials and Methods:
Subjects:
The study was conducted with two main groups of ages 16 to 21 i.e., the Male group and the Female group. The male group was subdivided into the Male Yoga Group (MYG) and the Male General Group (MGG). At the same time female group was subdivided into the Female Yoga Group (FYG) and the Female General Group (FGG). The sample size of each group was 30. The samples of male and female yoga groups were drawn from the population of students of age group 16-21 years who have practiced at least one and a half years of regular yoga, meditation, and pranayamas.

Email: debacharyya76@gmail.com

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The objective of this study was to find out the influence of Yogasana, Meditation and Pranayama practice on the Physiological and Psychological variables of College-level Students. Psychological fitness — or mental health — can be measured by assessing levels of anxiety, depression, stress, self-esteem, satisfaction, positive relationships, responsibility and competence. A person with high anxiety levels and poor relationships is not as psychologically fit as someone with low anxiety levels and rich relationships. And like ‘workouts’ that improve physical fitness, there are exercises that improve psychological fitness. The definition of health-related fitness involves exercise activities that you do to try to improve your physical health and stay healthy, particularly in the categories of cardiovascular endurance, muscular strength, flexibility, muscular endurance and body composition. Yoga is a holistic science of universal applicability and adaptability. Although originated in India, Yoga and meditation are being practiced throughout the world. The rather consistent and wide range of benefits and applications of yoga and meditation led numerous multi-disciplinary researchers to conduct research in these areas. An “Asana” is a body posture, originally and still a general term for a sitting meditation pose, and later extended in hatha yoga and modern yoga as exercise, to any type of position, adding reclining, standing, inverted, twisting, and balancing poses. “Pranayama” is control of Breath”. “Prana” is Breath or vital energy in the body. On subtle levels prana represents the pranic energy responsible for life or life force, and “ayama” means control. So Pranayama is “Control of Breath”.

Introduction

The samples were collected from the Yoga clubs, Akhadas, Educational Institutions, etc. by using the Simple Random Sampling Method from a population of more or less 2000 persons. At the same time, male and female samples of general groups will be collected from the population of general students of age group 16-21 years who never participated in any yoga and pranayamas by using the same technique. The population size may be more or less 2000.

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Tools

To test the psychological variables of the subjects Willoughby Social Anxiety Scale (WSAS), and Beck Depression Inventory (BDI) were used. To consider the Physiological well-being Resting Heart Rate (RHR), Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) of the subjects were measured and recorded.

Conclusion:

Significant differences were found between the yoga-practicing and non-practicing male groups concerning their mean social anxiety (WSAS). Both male and female yoga-practicing groups are significantly different in respect of their Diastolic Blood pressure. The yoga group showed improvement but no significant differences in the case of SBP and RHR.
Result and Discussion

Table No. 1
Mean and SD of four groups about WSAS scores

<table>
<thead>
<tr>
<th>Group</th>
<th>MYG</th>
<th>MGG</th>
<th>FYG</th>
<th>FGG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>62.83333</td>
<td>68.13333</td>
<td>77.2</td>
<td>75.3</td>
</tr>
<tr>
<td>SD</td>
<td>6.64071</td>
<td>6.09541</td>
<td>9.09111</td>
<td>11.694826</td>
</tr>
</tbody>
</table>

Table No. 1 shows that, for the MYG and MGG groups’ WSAS scores: MYG group has a mean of 62.83 with a standard deviation of 6.64. The MGG group has a mean of 68.13 with a standard deviation of 6.10. For the FYG and FGG groups WSAS scores: the FYG group has a mean of 77.20 with a standard deviation of 9.09. The FGG group has a mean of 75.30 with a standard deviation of 11.69.

Table No. 2
Mean and SD of four groups about BDI scores

<table>
<thead>
<tr>
<th>Group</th>
<th>MYG</th>
<th>MGG</th>
<th>FYG</th>
<th>FGG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>123.73333</td>
<td>127.966667</td>
<td>129.766667</td>
<td>147.166667</td>
</tr>
<tr>
<td>SD</td>
<td>18.604659</td>
<td>15.786252</td>
<td>25.471666</td>
<td>23.202383</td>
</tr>
</tbody>
</table>

Table No. 2 shows that, for the MYG and MGG groups’ BDI scores: the MYG group has a mean of 123.73 with a standard deviation of 18.60. The MGG group has a mean of 127.97 with a standard deviation of 15.79. For the FYG and FGG groups: the FYG group has a mean of 129.77 with a standard deviation of 25.47. The FGG group has a mean of 147.17 with a standard deviation of 23.20.

Table No. 3
Mean and SD of four groups about Systolic Blood Pressure

<table>
<thead>
<tr>
<th>Group</th>
<th>MYG</th>
<th>MGG</th>
<th>FYG</th>
<th>FGG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>125.03333</td>
<td>131.466667</td>
<td>127.733333</td>
<td>130.333333</td>
</tr>
<tr>
<td>SD</td>
<td>13.785258</td>
<td>19.821154</td>
<td>5.407105</td>
<td>8.790015</td>
</tr>
</tbody>
</table>

Table No. 3 shows the SBP of the MYG group has a mean of 125.03 with a standard deviation of 13.79. The MGG group has a mean of 131.47 with a standard deviation of 19.82. For the FYG and FGG groups: the FYG group has a mean of 127.73 with a standard deviation of 5.41. The FGG group has a mean of 130.33 with a standard deviation of 8.79.

Table No. 4
Mean and SD of four groups in relation to Diastolic Blood Pressure

<table>
<thead>
<tr>
<th>Group</th>
<th>MYG</th>
<th>MGG</th>
<th>FYG</th>
<th>FGG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>78.733333</td>
<td>88.633333</td>
<td>84.2</td>
<td>88.3</td>
</tr>
<tr>
<td>SD</td>
<td>7.473786</td>
<td>5.467669</td>
<td>5.14882</td>
<td>4.549725</td>
</tr>
</tbody>
</table>

Table No. 4 shows that in DBP data MYG group has a mean of 78.73 with a standard deviation of 7.47. MGG group has a mean of 88.63 with a standard deviation of 5.47. For the FYG and FGG groups: FYG group has a mean of 84.20 with a standard deviation of 5.15. FGG group has a mean of 88.30 with a standard deviation of 4.55.
According to Table No. 5 for RHR data of all groups: the MYG group has a mean of 78.57 with a standard deviation of 10.14. The MGG group has a mean of 81.83 with a standard deviation of 6.45. For the FYG and FGG groups: the FYG group has a mean of 78.47 with a standard deviation of 8.05. The FGG group has a mean of 81.83 with a standard deviation of 4.84.

<table>
<thead>
<tr>
<th>Group</th>
<th>MYG</th>
<th>MGG</th>
<th>FYG</th>
<th>FGG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>78.56667</td>
<td>81.83333</td>
<td>78.46667</td>
<td>81.83333</td>
</tr>
<tr>
<td>SD</td>
<td>10.13591</td>
<td>6.44918</td>
<td>8.046131</td>
<td>4.83581</td>
</tr>
</tbody>
</table>

Table No. 6 shows that, since p-value < α, H₀ is rejected. The average MYG’s population is considered to be not equal to the average of MGG’s population. In other words, the difference between the sample average of MYG and MGG is big enough to be statistically significant. The p-value equals 0.002111. (p(xd”T) = 0.001056). It means that the chance of type I error (rejecting a correct H₀) is small: 0.002111 (0.21%). The smaller the p-value the more it supports H₁. The test statistic T equals -3.2196, which is not in the 95% region of acceptance: [-2.002 : 2.002]. x₁-x₂ = -5.3, is not in the 95% region of acceptance: [-3.2957 : 3.2957]. The standard deviation of the difference, S’ equals 1.646, is used to calculate the statistic. The observed effect size d is large, 0.83. This indicates that the magnitude of the difference between the average and the average is large.

Table No. 6 shows that, since p-value > α, H₀ cannot be rejected. The average FYG’s population is assumed to be equal to the average of FGG’s population. In other words, the difference between the sample average of FYG and FGG is not big enough to be statistically significant. The p-value equals 0.4853. ( p(xd”T) = 0.7573 ). It means that the chance of type I error, rejecting a correct H₀, is too high: 0.4853 (48.53%). The larger the p-value the more it supports H₀. The test statistic T equals 0.7026, which is in the 95% region of acceptance: [-2.0043: 2.0043]. x₁-x₂ = 1.9, is in the 95% region of acceptance: [-5.4205: 5.4205]. The standard deviation of the difference, S’ equals 2.704, is used to calculate the statistic. The observed effect size d is small, 0.18. This indicates that the magnitude of the difference between the average and the average is small.
Table No. 8

Two sample t-test (Welch), using T distribution (two-tailed) about BDI of MYG and MGG

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MYG</td>
<td>123.733333</td>
<td>18.604659</td>
<td>-0.9503</td>
<td>0.346</td>
</tr>
<tr>
<td>MGG</td>
<td>127.966667</td>
<td>15.786252</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to Table No. 8, since p-value > α, H₀ cannot be rejected. The average of MYG's population is assumed to be equal to the average of MGG's population.

In other words, the difference between the sample average of MYG and MGG is not big enough to be statistically significant. The p-value equals 0.346, \( (p(xd"T) = 0.173) \). It means that the chance of a type I error, rejecting a correct H₀, is too high: 0.346 (34.6%). The larger the p-value the more it supports H₀.

The test statistic T equals -0.9503, which is in the 95% region of acceptance: [-2.0028: 2.0028]. \( x_1-x_2 = -4.23 \) is in the 95% region of acceptance: [-8.9221: 8.9221].

The standard deviation of the difference, S’, equals 4.455, is used to calculate the statistic. The observed effect size \( d \) is small, 0.25. This indicates that the magnitude of the difference between the average and the average is small.

Table No. 9

Two sample t-test (Welch), using T distribution (two-tailed) about BDI of FYG and FGG

<table>
<thead>
<tr>
<th>Group</th>
<th>FYG</th>
<th>FGG</th>
<th>t</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>129.766667</td>
<td>147.166667</td>
<td>-3.2196</td>
<td>0.002111</td>
</tr>
<tr>
<td>SD</td>
<td>25.4716667</td>
<td>23.202383</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to Table No. 9 since p-value < α, H₀ is rejected. The average of MYG's population is considered to be not equal to the average of MGG's population. In other words, the difference between the sample average of MYG and MGG is big enough to be statistically significant.

The p-value equals 0.002111, \( (p(xd"T) = 0.001056) \). It means that the chance of type I error (rejecting a correct H₀) is small: 0.002111 (0.21%).

The smaller the p-value the more it supports H₁. The test statistic T equals -3.2196, which is not in the 95% region of acceptance: [-2.002: 2.002].

\( x_1-x_2 = -5.3 \), is not in the 95% region of acceptance: [-3.2957: 3.2957].

The standard deviation of the difference, S’, equals 1.646, is used to calculate the statistic.

The observed effect size \( d \) is large, 0.83. This indicates that the magnitude of the difference between the average and the average is large.

Table No. 10

Two sample t-test (Welch), using T distribution (two-tailed) about SBP of MYG and MGG

<table>
<thead>
<tr>
<th>Group</th>
<th>MYG</th>
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<th>t</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>125.033333</td>
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<td>SD</td>
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<td>19.821154</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to Table No. 8, since p-value > α, H₀ cannot be rejected. The average of MYGSBP's population is assumed to be equal to the average of MGGSBP's population. In other words, the difference between the sample average of MYGSBP and MGGSBP is not big enough to be statistically significant. The p-value equals 0.1505, \( (p(xd"T) = 0.07524) \). It means that the chance of type I error, rejecting a correct H₀, is too high: 0.1505 (15.05%). The larger the p-value the more it supports H₀.

The test statistic T equals -1.4595, which is in the 95% region of acceptance: [-2.0069: 2.0069]. \( x_1-x_2 = -6.43 \), is in the 95% region of acceptance: [-8.8464: 8.8464].

The standard deviation of the difference, S’, equals 4.08, is used to calculate the statistic. The observed effect size \( d \) is medium, 0.38. This indicates that the magnitude of the difference between the average and average is medium.
According to Table No. 11, since p-value < α, $H_0$ is rejected. The average of MYGDBP’s population is considered to be not equal to the average of MGGDBP’s population. In other words, the difference between the sample average of MYGDBP and MGGDBP is big enough to be statistically significant. The p-value equals $3.048e-7$, (p(xd"T) = 1.524e-7). It means that the chance of type I error (rejecting a correct $H_0$) is small: 3.048e-7 (0.00003%). The smaller the p-value the more it supports $H_1$. The test statistic T equals -5.8556, which is not in the 95% region of acceptance: [-2.0056: 2.0056]. $\bar{x}_1-\bar{x}_2$=-9.9, is not in the 95% region of acceptance: [-3.3909 3.3909]. The standard deviation of the difference, S’ equals 1.691, is used to calculate the statistic. The observed effect size d is large, 1.51. This indicates that the magnitude of the difference between the average and average is large.

According to Table No. 12, since p-value > α, $H_0$ cannot be rejected. The average of MYGRHR’s population is assumed to be equal to the average of MGGHR’s population. In other words, the difference between the sample average of MYGHR and MGGHR is not big enough to be statistically significant. The p-value equals 0.1428, (p(xd"T) = 0.07139). It means that the chance of type I error, rejecting a correct $H_0$, is too high: 0.1428 (14.28%). The larger the p-value the more it supports $H_0$. The test statistic T equals -1.4893, which is in the 95% region of acceptance: [-2.0094 : 2.0094]. $\bar{x}_1-\bar{x}_2$=-3.27, is in the 95% region of acceptance: [-4.4074 : 4.4074]. The standard deviation of the difference, S’ equals 2.193, is used to calculate the statistic. The observed effect size d is medium, 0.38. This indicates that the magnitude of the difference between the average and average is medium.

According to Table No. 13, since p-value > α, $H_0$ cannot be rejected. The average of FYGSBP’s population is assumed to be equal to the average of FGGSBP’s population. In other words, the difference between the sample average of FYGSPB and FGGSPB is not big enough to be statistically significant. The p-value equals 0.174, (p(xd"T) = 0.08699). It means that the chance of type I error, rejecting a correct $H_0$, is too high: 0.174 (17.4%). The larger the p-value the more it supports $H_0$. The test statistic T equals -1.3799, which is in the 95% region of acceptance: [-2.0104 : 2.0104]. $\bar{x}_1-\bar{x}_2$=-2.6, is in the 95% region of acceptance: [-3.7879 : 3.7879]. The standard deviation of the difference, S’ equals 1.884, is used to calculate the statistic. The observed effect size d is medium, 0.36. This indicates that the magnitude of the difference between the average and average is medium.
According to Table No. 14, since \( p \)-value < \( \alpha \), \( H_0 \) is rejected. The average of FYGDBP’s population is considered to be not equal to the average of FGGDBP’s population. In other words, the difference between the sample average of FYGDBP and FGGDBP is big enough to be statistically significant. The \( p \)-value equals 0.001834, \( (p(x_d^T) = 0.000917) \). It means that the chance of type I error (rejecting a correct \( H_0 \)) is small: 0.001834 (0.18%). The smaller the \( p \)-value the more it supports \( H_1 \).

The test statistic \( T \) equals \(-3.2683\), which is not in the 95% region of acceptance: \([-2.0024 : 2.0024]\). \( x_1 - x_2 = -4.1\), is not in the 95% region of acceptance: \([-2.5119 : 2.5119]\).

The standard deviation of the difference, \( S' \) equals 1.254, is used to calculate the statistic. The observed effect size \( d \) is large, 0.84. This indicates that the magnitude of the difference between the average and average is large.

According to Table No. 15, since \( p \)-value > \( \alpha \), \( H_0 \) cannot be rejected. The average of FYGRHR’s population is assumed to be equal to the average of FGGDBP’s population. In other words, the difference between the sample average of FYGRHR and FGGDBP is not big enough to be statistically significant. The \( p \)-value equals 0.05536, \( (p(x_d^T) = 0.02768) \). It means that the chance of a type I error, rejecting a correct \( H_0 \), is too high: 0.05536 (5.54%). The larger the \( p \)-value the more it supports \( H_0 \).

The test statistic \( T \) equals \(-1.9643\), which is in the 95% region of acceptance: \([-2.0111 : 2.0111]\). \( x_1 - x_2 = -3.37\), is in the 95% region of acceptance: \([-3.4469 : 3.4469]\).

The standard deviation of the difference, \( S' \) equals 1.714, is used to calculate the statistic. The observed effect size \( d \) is medium, 0.51. This indicates that the magnitude of the difference between the average and average is medium.

**Conclusion**

Significant difference is found between the yoga-practicing and non-practicing male groups concerning their mean social anxiety (WSAS). Yoga groups showed improvement but no significant change in depression levels. Both male and female yoga-practicing groups are significantly different in respect of their Diastolic Blood pressure. The yoga group showed improvement but no significant differences in the case of SBP and RHR.

**References:**


