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Abstract

Elements of Common Mental Disorders (CMD) like stress, depression and anxiety are significant contributors to the global burden of disease. Even though they affect people at all socioeconomic levels, most people in low- and middle-income nations lack access to efficient psychological and pharmaceutical interventions. One potential solution to this issue is the application of traditional low-intensity psychological interventions like Yagna Pathy. The current cross sectional pilot study includes a total of 426 heterogenous group of people suffering from Stress, Anxiety and Depression (both in normal and diseased range) received Yagna pathy for 30 days. The severity of the stress, anxiety and depression was evaluated using a validated depression, anxiety, and stress (DAS) score questionnaire. A significant association (chi square, \( p<0.001 \)) was found between the metal disorders with gender and activity status of the participants. Strong inter-correlation (\( R^2>0.7; p<0.001 \)) among features of stress, anxiety and depression also proved the manifoldness of the CMD. Well directed Yagna pathy for a defined duration sustained to be efficient in controlling stress, anxiety, and depression as evident by comparing their DAS scores. A receiver operating characteristic (ROC) of the responses was also found to be “excellent”. Thus, with statistically accepted sample group the current study could prove the effectivity of traditional practices like Yagna Pathy in controlling the severity of CMD which could be easily implemented as a non-medicated, noninvasive, and cost-effective therapy worldwide.

Key words: Stress; Anxiety; Depression; Yagna Pathy; Hawan; Psychology
Introduction

According to WHO, Common Mental Disorders (CMD) were the second and sixth main causes of illness and are considered a global burden (GBD 2019 Mental Disorders Collaborators, 2022; Tan et al., 2022). Anxiety and depression are the two major symptoms that make up the majority of CMD. This neurotic and nonpsychotic affective disorder is designated as “common” because they are widely prevalent in the community and primary care (Goldberg, 1994). Stress, which is characterized as any form of change that creates physical, mental, or psychological strain, intensifies this further. Still, Mental health was one of the most neglected areas of health globally (Kovacevic, 2021). This was held before the COVID-19 pandemic, but the pandemic has rendered mental health conditions much worse. The COVID-19 pandemic, one of the global catastrophes of the present generations, has had profound and far-reaching effects on the physical and mental well-being of Mankind. The pandemic destroyed the mental peace of the people for at least two years spans, and it’s continued till now (Alison Holman et al., 2020; Ettman et al., 2020; Wang et al., 2021; WHO, 2022a, 2022b; Yashadhana et al., 2022). During the said period billions of people have perished or lost their jobs. Communities and families have become strained and fractured. Young people have been denied the opportunity to learn and interact with others. Companies have filed for bankruptcy. Millions of individuals are living in poverty to date (Aneja & Ahuja, 2021; Rasul et al., 2021; UNDP, 2022). Above all, as of 29th September 2022, 65.4 lakh people have lost their lives (Our World in Data, 2022). Therefore, the consequences retain a long-lasting effect on the mental wellness of people. The evidence of the same can also be perceived by both cross-sectional (Afrin et al., 2022; Jassim et al., 2021; Radwan et al., 2021; Reagu et al., 2021) and longitudinal investigations (Morales-Montoya et al., 2022; Ramiz et al., 2021; Reuter et al., 2021), that have looked at the psychological effects for patients. Studies have shown that those
who have been quarantined have a higher prevalence of psychological symptoms, emotional disturbance, melancholy, stress, mood swings and irritability, sleeplessness, post-traumatic stress symptoms, hostility, and emotional exhaustion. Notably, other psychological reactions to quarantine include fear, rage, anxiety, insomnia, perplexity, grief, and numbness (Hamaideh et al., 2022; Li et al., 2021; Shah et al., 2021). A delayed return to normalcy even months after the quarantine as well as long-term behavioral modifications like attentive handwashing and avoiding crowds were also documented. Anxiety and trepidation have a big impact on everyone in society. According to recent studies, those who are quarantined or kept in isolation exhibit higher than usual levels of tension, wrath, perplexity, and worry (Abbott, 2021; Ettman et al., 2020; Rasul et al., 2021; Rodríguez-Hidalgo et al., 2020). In general, every study that has examined the psychological disorders during the COVID-19 pandemic has discovered that those affected show a variety of signs of mental trauma, such as emotional distress, depression, stress, mood swings, irritability, insomnia, attention deficit hyperactivity disorder, post-traumatic stress disorder, and anger (Alison Holman et al., 2020; Jassim et al., 2021; Reuter et al., 2021; WHO, 2022a). Additionally, research indicates that exposure to unfortunate news about Covid-19 in the media regularly had a significant impact on mental tranquility (Longest & Kang, 2022; Su et al., 2021; Wheaton et al., 2021). The present lockdown in India appears to have a diverse impact on many individuals based on their sex, occupation, socioeconomic status, or place of residence, among other factors (Goel et al., 2021; R. Kumar et al., 2020; Sardar et al., 2020; M. Shukla et al., 2021; Soni, 2021). According to the World Bank Report of 2021, nearly 1 billion people live with a mental disorder and more than 75% of people with the disorder do not receive treatment (Our World in Data, 2022). Thus, it is considered a burden, especially for middle- and lower-income countries.
Various interventions were prescribed to reduce mental illness during this time. Integration of conventional medicines with traditional therapies is being advised by experts to tackle the consequences of the Covid-19 pandemic (Bouare et al., 2022; Gerotziafas et al., 2021; Lam et al., 2021; Moradian et al., 2020; Tillu et al., 2020). Performing Yagna Pathy or Havran in the household is one such noble traditional method. In India, Yagna is considered a spiritual offering to God for the well-being of the family. Yagna as a therapy for psychological ailments provides pulmonary inhalation of medicinal smoke of multiple herbs (generated through oblation in fire along with chanting of Vedic hymns), which has the potential for therapeutic results (Panwar et al., 2021). According to existing knowledge, the best drug delivery methods for brain-related illnesses are nasal drug administration systems (Bahadur et al., 2020; Giunchedi et al., 2020; Jeong et al., 2022; Trevino et al., 2020). Thus, inhaling the smoke originating from Havran must have a positive impact on neurological well-being. The specific shape and size of the Agni-Kunda (Energy Field), the arrangement of wood pieces in it, and the time-frequency and amount of ingredients used in Havran account for controlled chemical processing in the fire and lead to sublimation, chemical conversion and/or transformation into vapor phase of the herbal/plant medicinal preparation leading to release the smokes of medicinally important phytochemicals (Bansal et al., 2015; Chaube, Chaube, Saxena, Solanki, Chandra Tiwari, et al., 2020; N. Kumar et al., 2020; Rastogi et al., 2022). The reference to the effectiveness of Yagna has been documented in ancient literature in Indian medicine. Acharya Charak has indicated in Charak Samhita to perform Yagna for peace of mind and cleaning of the environment in pandemic conditions to calm mental disturbance due to fear, stress, and anxiety (Bhavana & Shreevathsa, 2014). The effect of rhythmic Vedic hymns and inhalation of medicated fume create a feeling of peace and happiness in them, and the environment also get fresh and calm as stated in Veda and other Ayurvedic literature (Verma et al.,
In support of the above, contemporary studies showed the binding property of the ingredients of herbal smoke with CB2 receptors, responsible for anxiety disorders (Romana et al., 2020). Furthermore, the components of Yagna seem to have multiple actions in preventing anxiety through scavenging free radicals, increasing in level of antioxidants, and other underlying mechanisms (Bansal et al., 2015; Chaube, Chaube, Saxena, Solanki, Chandra Tiwari, et al., 2020). Similarly, generation of the electromagnetic waves during performing Yagna could alleviate psychological depression (D. Kumar, 2019). Apart from that the anti-microbial, antioxidant, immune protective and air cleaner role of herbal smoke released from Yagna is also evident in the literature (Chaube, Chaube, Saxena, Solanki, Chandra Tiwari, et al., 2020; D. Kumar, 2019; N. Kumar et al., 2020; Rastogi et al., 2022; S. D. Shukla et al., 2012). Although several studies could provide indirect indications regarding the psychoneurological effect of Yagna, a gap regarding the validation of the same still exists. Earlier studies have tried to justify the same, but the size of the sample is too less to be significant (Hedge, 2014; M. Kumar & Shrivastava, 2022; Nilachal & Trivedi, 2019).

With the perspectives in mind, the current study seeks to examine the levels of anxiety, stress, and depression among self-reporting patients during the COVID-19 outbreak and determine whether performing Yagna as a form of intervention will help to control the disorders. As the present study falls under observational study (Cross-sectional) we have followed STROBE guidelines (STROBE, 2022) to conduct the same.

**Material and Methods**

**Study Design & Participants Recruitment**

This present study contains a cross-sectional design. 520 health-seekers suffering from different common mental disorders (Stress, Depression, and Anxiety) initially approached Patanjali
YogGram, Haridwar, India (Latitude: 28.64739 Longitude: 77.19265) for the treatment purpose. These self-claimed patients were requested to fill out the DASS-42 form before and after the intervention (treatment) process. To check the level of anxiety, stress, and depression both pre- and post-intervention online questionnaires using the Depression Anxiety Stress Scales (DASS) scale (Clark & Watson, 1991; Lovibond & Lovibond PFC, 2013) distributed through Google Forms. DASS-42 consists of 42 items in three categories namely Depression, anxiety, and stress. Question number 3, 5, 10, 13, 16, 17, 21, 24, 26, 31, 34, 37, and 42 are regarding depression, Question number 2, 4, 7, 9, 15, 19, 20, 23, 25, 28, 30, 36, 40, and 41 are for anxiety and question number 1, 6, 8, 11, 12, 14, 18, 22, 27, 29, 32, 33, 35, and 39 are for stress. A categorization of the different dimensions is obtained by summing up the scores on the answers to the items that correspond to each of the variables. The choices available to react to this scale were: 0: did not apply to me at all; 1: applied to me to some extent or some time; 2: applied to me to a significant degree or most of the time; and 3: applied to me a great deal or most of the time; The severity ratings used to interpret are shown in Table 1 (Clark & Watson, 1991; Lovibond & Lovibond PFC, 2013). All Questionnaires were conducted in British English.

Among the obtained responses we have applied the inclusion criteria. We have included only those respondents who have completed the full duration of the intervention. No external medication or any other intervention other than Yagna pathy has been applied in this tenure. Thus, there were 426 participants (86%) selected for the study. The study design has been summarized in Figure.1.
Figure 1. Design of Participants recruitment for the study

Table 1. DASS Scale

<table>
<thead>
<tr>
<th>Severity</th>
<th>Depression (DASS-A)</th>
<th>Anxiety (DASS-A)</th>
<th>Stress (DASS-S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>0–9</td>
<td>0–7</td>
<td>0–14</td>
</tr>
<tr>
<td>Mild</td>
<td>10–13</td>
<td>8–9</td>
<td>15–18</td>
</tr>
<tr>
<td>Moderate</td>
<td>14–20</td>
<td>10–14</td>
<td>19–25</td>
</tr>
</tbody>
</table>
Sample Size Validation

A sample that is larger than necessary will be a better representative of the population and will hence provide more accurate results. However, beyond a certain point, the increase in accuracy will be small and hence not worth the effort and expense involved in recruiting the extra patients. Therefore, the minimum number of samples required to get statistically significant results is of utmost importance before conducting a study. Here to find the minimum sample size, we set up the statistical constraints like a 5% margin of error, 50% population proportion, and a confidence interval was 95%. Initially, we received a total of 520 applicants for the study, the population size was set up as 520. Thus, according to the formula stated below.

\[
n' = \frac{n}{1 + \frac{z^2 \times \hat{p} (1 - \hat{p})}{\varepsilon^2 N}}
\]

The calculated minimum sample size to meet the above statistical constraints was 222. Here \( z \) is the \( z \) score that is 1.95 at a 95% confidence interval; \( \varepsilon \) is the margin of error (5%); \( N \) is the population size (520) and \( \hat{p} \) is the population proportion (50%). Therefore, our selected sample size (426) proved to be sufficient to obtain a statistically significant result.

Yagna Pathy: The Intervention
The group of experienced experts in perfuming *Hawan or Yagna* used to guide the participants to do it correctly. The materials used for performing Hawan were A simple Havan Kund, One bundle of mango or any other suitable wood / Dry cow dung (Keep aside three individual wood sticks as “Samidha”), Some Camphor, 250g Pure Havan Samagree, 250g Ghee (Melted), Some Sweet Rice, a container with fresh water and a teaspoon, Matches/Fire lighter, A lamp to be placed in front of the Havan kund and the Havan Samgri.

As described in the book “Sankshipt Gayatri Hawan Vidhi” by Pt. Shriram Sharma Acharya, *Yagya* was performed (Sharma, 2010). This study was conducted in a big room surrounded by four walls and two windows for ventilation. Also, the four walls were coated with cow dung along with the Yagya Kunda (fire pit). The four participants were made to sit on the four sides of the *Kunda*. *Yagya* was performed in the morning during the time of sunrise with special herbal powder available from Patanjali, Haridwar, India (Supplementary 1). Dried Cow dung patties of the indigenous breed were used as samadhi (firewood) and the fire pit used was made of clay and bricks. The mantras used were the *Surya Gayatri mantra* and the *Chandra Gayatri mantra*, with 12 oblations of both mantras. The procedure was conducted for 45 mins daily for 30 days.

**Statistical Analysis**

The continuous variables of the study are presented in mean ± standard deviation and categorical variables were presented in frequency (%). For sample representativeness, the participants were compared concerning substance use and sociodemographic characteristics using Chi-Square($X^2$) test. In all cases, the data were analyzed for normality using the Shapiro–Wilk Test and considering the skewness and kurtosis values before the application of the hypothesis testing.

For hypothesis testing, a two-sample two-tailed z-test is used to compare the means of Stress, Depression, and Overall DASS scores in Previous and the Post-intervention. So, if the mean score
of the samples (both patients and normal) before the Yagna is $\mu_1$ and after Yagna is $\mu_2$. Then the null hypothesis ($H_0$) was set as “The performance of Yagna does not affect reducing the Stress, Depression and Anxiety disorders” that is $\mu_1=\mu_2$. The alternative hypothesis ($H_1$) was “The performance of Yagna has a definite effect on reducing the Stress, Depression and Anxiety disorders” that is $\mu_1\neq\mu_2$. For this study, we have taken $\alpha$ as 5%. Thus, if the $p < \alpha$ then only the alternative hypothesis would be accepted. The overall approach of hypothesis testing, and empirical formula of the z test has been adopted from Ghosh et al. in 2013 (Ghosh et al., 2013).

The association among the common mental disorders (stress, anxiety, and depression) with each other was found by the linear regression of the DASS scores with an estimation of person correlation and goodness of fit values.

The discriminative accuracy of the DASS was evaluated by the receiver-operating characteristic (ROC) curve analysis. (Park et al., 2004). A ROC curve plots the sensitivity and specificity at each consecutive threshold value. The area under the ROC curve (AUC) is a suitable parameter to summarize the overall discriminative value of a screening instrument. A value of 0.70 or more can be interpreted as reasonable, 0.80 up to 0.90 as good, and 0.90 or over as excellent (Carter et al., 2016; Hanley & McNeil, 1983; Park et al., 2004; Ryu et al., 2016). Regarding the performance of all the statistical methods, we have used GraphPad Prism (Ver 8) and MS EXCEL.

**Ethical Approval**

The ethical committee has approved the study as a part of project no. PAC/IEC/2022/11/37 entitled “Attitude towards integrated pathy as a questionnaire-based observational study for the assessment of patients vising Patanjali wellness, Haridwar for their improvement and chemical-acceptance
towards integrated pathy” Here we are reporting a retrospective study of medical records and all data were fully anonymized before accessed them.

Results

Before performing Yagna Pathy, the total DASS scores (DASS-D+DASS-A+DASS-S) of 87 participants among 426 patients were found on or below 30. This implies that the said participants were under the “Normal range” according to the specified DASS table (Table 1). Similarly, the rest of the 339 patients were found to be in the diseased range (mild/moderate/severe/ extremely severe) of common mental disorders. The above pre-screening of patients aids the study in two ways. First, we can identify the diseased range, thus the effect of the intervention on the said range can be clarified. Secondly, the effect of Yagna Pathy on the mental situation of normal-range patients could also be explored.

The internal Consistency measurement (Cronbach alpha value), for DASS-S, DASS-D, and DASS-A scores were found to be 0.71, 0.70, and 0.79 respectively for the present study, and the overall DASS score was found to be 0.737. All the values were acceptable according to the previous studies (Tavakol & Dennick, 2011)

Table 1. Socio-Demographic Profiling of the participants

<table>
<thead>
<tr>
<th>Demographic Parameters</th>
<th>Stress (DASS-S)</th>
<th>Anxiety (DASS-A)</th>
<th>Depression (DASS-D)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Numb</td>
<td>Numb</td>
<td>Numb</td>
</tr>
<tr>
<td></td>
<td>CHI-Square (df)</td>
<td>CHI-Square (df)</td>
<td>CHI-Square (df)</td>
</tr>
<tr>
<td>Number of Patients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Disease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category (0-14)</td>
<td>Category (15-34+)</td>
<td>Category (0-7)</td>
<td>Category (8-20+)</td>
</tr>
<tr>
<td>-----------------</td>
<td>-------------------</td>
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<table>
<thead>
<tr>
<th>Age Group</th>
<th>17-34</th>
<th>34</th>
<th>99</th>
<th>0.46(2</th>
<th>57</th>
<th>74</th>
<th>0.46(2</th>
<th>30</th>
<th>101</th>
<th>0.91(2</th>
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<tr>
<td></td>
<td>35-52</td>
<td>55</td>
<td>135</td>
<td>)</td>
<td>90</td>
<td>102</td>
<td>)</td>
<td>53</td>
<td>139</td>
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<td></td>
<td>53-70</td>
<td>29</td>
<td>74</td>
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<td>58</td>
<td>26</td>
<td>77</td>
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<table>
<thead>
<tr>
<th>Gender</th>
<th>Male</th>
<th>52</th>
<th>116</th>
<th>1.46(1</th>
<th>87</th>
<th>81</th>
<th>5.05(1</th>
<th>42</th>
<th>126</th>
<th>0.05(1</th>
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<tr>
<td></td>
<td>Female</td>
<td>66</td>
<td>192</td>
<td>105</td>
<td>153</td>
<td>67</td>
<td>191</td>
<td></td>
<td>0.82</td>
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<table>
<thead>
<tr>
<th>Marital Status</th>
<th>Married</th>
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<th>236</th>
<th>0.08(1</th>
<th>147</th>
<th>181</th>
<th>0.03(1</th>
<th>87</th>
<th>239</th>
<th>0.7(1</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Unmarried</td>
<td>26</td>
<td>72</td>
<td>)</td>
<td>45</td>
<td>53</td>
<td>)</td>
<td>22</td>
<td>76</td>
<td>0.40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Smoking habits</th>
<th>Yes</th>
<th>6</th>
<th>6</th>
<th>3.06(1</th>
<th>6</th>
<th>6</th>
<th>0.12(1</th>
<th>4</th>
<th>8</th>
<th>0.38(1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>112</td>
<td>302</td>
<td>)</td>
<td>)</td>
<td></td>
<td>)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Alcohol intake     | Yes    | 5  | 14  | 10  | 9  | 4  | 15    |     |      |       |

|                   |        |    |     |     |    |    |       |     |      |       |
In this study, the mean age of the participants was 42.15 (±12.81) years. The females and male participants were 258 (60.56%) and 168 (39.44%) respectively. There were 328 (77%) participants are married, and 98 (23%) participants are unmarried. Only 12 (2.82%) participants have habits of smoking, and 414 (97.18%) participants were non-smokers. 407 (95.54%) participants are non-alcoholic, and the rest were 19 (4.46%) participants were alcoholic. 166 (38.97%) participants reported having medication intake for different lifestyle diseases while 260 (61.03%) participants were not using any medication. The activity status of participants is light, moderate, sedentary, and vigorous with 40 (9.39%), 323 (75.82%), 13 (3.05%), and 50 (11.74%) respectively.

To get a more comprehensive insight regarding the demographic features with different elements of mental disorders, we have further divided the categorical data into stress, anxiety, and
depression level. In the case of stress, anxiety, and depression category, a maximum number of participants are in the 35 to 52 age group. Among them, the Number of Patients under Diseased Category is dominated on the number of patients under normal category. But we found no significant difference among the age groups with stress, anxiety, and depression disorders. Thus, with age, mental illness is not associated according to the Chi-square test ($p>0.05$). We find a similar result in the case of Marital status, Alcohol intake, medication intake, and smoking habits. While in the case of gender, we only found a significant association with anxiety. There was a significant association ($p<0.01$) between anxiety, stress, and depression with daily physical activities. Both diseased and normal categories follow the same association.
Previous Practicing Yagna

Post Practicing Yagna Pathy
Figure 1. Association among Stress, Anxiety, and Depression

In the current study, we have encountered patients who have stress or anxiety or depression, or any of the two or all three mental illnesses. Thus, this is obvious to probe whether there is any relation between these three mental illnesses. The regression analysis shows the linear relationship between stress and anxiety; anxiety and depression and between depression and stress (both previous and post-performing *Yagna Pathy*) Moderately strong association ($R^2 > 0.7; p<0.001$) reflect in each case (Figure 1). This strongly suggests that if someone is suffering from stress then he would have a higher possibility to develop both depression and anxiety with vice versa.
**Table. 2. Effects of Yagna Pathy on mean scores of DASS-D, DASS-A, and DASS-S scales**

<table>
<thead>
<tr>
<th>Mental Conditions</th>
<th>Participants under the Normal Category</th>
<th>Participants under Diseased Category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean Score</td>
<td>Mean Score</td>
</tr>
<tr>
<td>Stress (DASS-S)</td>
<td>Before: 9 (±4.1)</td>
<td>After: 3(±2.8) #</td>
</tr>
<tr>
<td>Depression (DASS-D)</td>
<td>Before: 5.7(±3) #</td>
<td>After: 2.4(±2) #</td>
</tr>
<tr>
<td>Anxiety (DASS-A)</td>
<td>Before: 5.2</td>
<td>After: 2.2(±1.9) #</td>
</tr>
<tr>
<td>DASS-Score</td>
<td>Before: 20</td>
<td>After: 7.5(±5.8) #</td>
</tr>
</tbody>
</table>

***p<0.001 (Significant at 99% confidence interval); #Scores denotes the NORMAL condition of Mental Disorders; $Scores denotes SEVERE/MODERATE condition of Mental Disorders according to the DASS scoring table
Figure 2. Effect of Yagna Pathy on Mental illness of patients under normal category
Figure 3. Effect of Yagna Pathy on Mental illness of patients under the normal category.

The effect of the intervention that is Yagna Pathy on relieving mental illness was found by comparing the mean scores of Stress (DASS-S), Anxiety (DASS-A), and Depression (DASS-D) previous and post-performance of Yagna Pathy. To validate or observe the holistic effect, we have only selected participants who have completed the full course of Yagna Pathy. According to the results obtained, the mean scores of stress, anxiety, and depression for the participants in the diseased group have significantly (p<0.001) reduced by 60.8%, 60.3%, and 61.9% respectively. The overall DASS score has been reduced by 60.8% among the said group of participants (Figure 2; Table 3). This observation led us to investigate the effect of Yagna Pathy on the participants
who are classified into the normal category. The Yagna Pathy also proved to retain a profound effect on the reduction of stress, anxiety, and depression in the previous manner (Figure 3). In this case, a 66.6% reduction was observed in DASS-S and 57.8% in DASS-D while 63.3% in the case of DASS-A. The overall DASS score of the participants under the Normal category has been reduced by 62.5% (Figure 3; Table 3). The difference between the pre- and post-mean scores was also found to be significant at a 95% confidence interval calculated by a two-tailed z-test.

**Reliability test**

To determine the cut-off values giving the best balance between sensitivity and specificity, ROC curves were computed (Figure 4A, 4B and 4C).
Figure 4. Receiver Operating Characteristics (ROC) of the Stress (4A), Anxiety (4B) and Depression (4C)

This yielded statistically significant areas under the ROC-curves for DASS-S (AUC 0.93, 95% CI 0.92–0.95; \( p < 0.001 \)) in predicting stress, DASS-A (AUC 0.89, 95% CI 0.86–0.91; \( p < 0.001 \)) in predicting anxiety and DASS-D (AUC 0.88, 95% CI 0.86–0.91; \( p < 0.001 \)) in predicting depression. The overall DASS score (AUC 0.92, 95% CI 0.91–0.94; \( p < 0.001 \)). According to the AUCs, the overall discriminative value of the DASS-S, DASS-A, and DASS-D subscale as well as the overall DASS can be interpreted as “excellent”.

Discussion

The present study could open different avenues regarding mental wellness. First, common mental illnesses like stress, anxiety, and depression could be well expressed in people of all ages starting from adolescence to retirement age. Although we found no such significant association with age for stress and depression-affected individuals except for anxiety. Onset of anxiety disorders can also be influenced by psychological and social risk factors. Geriatric anxiety and depression share several risk factors, including female gender, cognitive impairment, chronic health issues, poor self-rated health, functional restrictions, and personality features like neuroticism and inadequate coping mechanisms (Lenze & Wetherell, 2022; Schulz et al., 2002). In the case of other social-demographic factors like alcohol intake, smoking habits, and medication intake, we also don’t find an association with common mental disorders. Some previous studies could prove that the effect of the above-mentioned elements has a profound effect on stress, anxiety, and depression. Perhaps in the present case, the participants are hiding or not willing to share their ill habits. Thus, the
proportion of affirmative and negative cases varied significantly. One of the most promising and expected outcomes of the study was to showcase the importance of physical activity in mental well-being. We could observe a significant association between any type of physical activity that exists with stress, depression, and anxiety. In the world of modern medicine, the benefits of regular physical activity on health are without dispute. The mechanisms behind exercise's antidepressant benefits are still unknown, even though research consistently links exercise with depression. Thermogenic theory (Craft & Perna, 2004), endorphin hypothesis (Deboer et al., 2012), monoamine hypothesis (Heninger et al., 1996), distraction hypothesis (Privitera et al., 2014), self-efficacy enhancement (Meng et al., 2022), and other plausible physiological and psychological causes have all been discussed. Most of these theories, however, have little research backing them up. Another interesting finding of the present study is the significant strong correlation ($R^2>0.7$; $p<0.05$) among the subscales of DAS (DASS-A, DASS-S, and DASS-D). In both cases of pre and post-performance of Yagna therapy, the observation remains the same. This implies two conclusions, first, if someone develops any one attribute of common mental disorders, the other two or one element of CMD that is stress or anxiety or depression, could also develop. Secondly, after the performance of Yagna Pathy, all three attributes are reduced correlativelative. Thus, this can be inferred that Yagna Pathy could be fruitful for controlling common mental disorders holistically. There was no such association with these mental disorders in previous literature till now. Thus, the present study could provide a noble avenue for further medical research. The main goal of our study was to determine whether Yagna Pathy could have a controlling effect on common mental disorders and if yes then to what extent? As cited in previous literature, Yagna is considered a powerful and comprehensive ancient therapy. Any type of sickness, whether somatic, mental, somatopsychic, or psychosomatic, can be improved by this therapy. Yagna is
more of a religious practice but is also considered an herbal smoke therapy recommended for mental peace. Along the same lines, in this present study we could validate that the Yagna herbal smoke therapy has significantly reduced anxiety, depression, and stress (Table 2). There are three aspects of performance of Yagna which could affirmatively affect mental wellness. First, the ingredients used in the Yagna therapy led to the release of herbal smoke. Studies could prove that the ingredients are diversified and effective while they are released as herbal smoke during performing Yagna. While performing Yagna the ingredients are used to pour into the fire and mantras are chanted. The pouring is called Agni Hotra. “Agni” means ‘fire’ and “Hotra” means an ‘offering’; Agnihotra means the act of an oblation into the fire (Limaye, 2020). Agnihotra consists of a base fire generated in a specifically designed vessel fixed on the surface of the level ground. Burning fire of some specified characteristics forms the base fire. To this base fire specific substances like clarified butter (ghee) and herbal materials are added in the form of oblations. The detailed literature has been reviewed by Chaube and the coworkers (Chaube, Chaube, Saxena, Solanki, Tiwari, et al., 2020). The study also provided the information of active compounds released during the Yagna which eventually have significant effect on different parts of nervous system. Apart from that, the herbal smoke was proved to be air cleanser and could act as antifungal, anti-bacterial agent. The chanting of mantras is acted as noise therapy(Chaube, Chaube, Saxena, Solanki, Tiwari, et al., 2020). During the hawan, dev yagya & balivaishv dev yagya, and other mantras are chanted. The frequencies of mantras coupled with herbal smoke bring a resonance effect on the brain neurons and possibly that may bring peace of mind (Acharya, 2012; Farrar & Farrar, 2020). Previous studies also support the same but the number of participants who participated in the studies was not significant to justify (Hedge, 2014; M. Kumar & Shrivastava, 2022; Nilachal & Trivedi, 2019). The present study involves a significant sample size as per power
analysis. Thus, it holds significant justification for the effectiveness of *Yagna Pathy* to control common mental disorders. Finally, to the best of our knowledge, this is the first study of its sort to statistically validate the efficacy of *Yagna Pathy* on a significant, impartial population.

**Shortcomings of the study**

Some shortcomings do exist for the present study like we were unable to obtain any biochemical or brain imaging results from the subjects that would have allowed for a more exact correlation with the DASS questionnaire. Additionally, we were unable to see how *Yagna Pathy* affected prevalent mental diseases in a dose-dependent manner. We were likewise unable to comment on any potential causal links in the data because of the cross-sectional design of this study.

**Conclusion**

In conclusion, the study reveals the *Yagna Pathy* as a complementary, non-invasive, low-intensity psychological and cost-effective approach to manage stress, anxiety, and depression related disorders. Thus, it was recommended to practice *Yagna Pathy* at least twice a week to maintain mental wellness.


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