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RESEARCH ARTICLE

# Yoga and Rasayana for Mental Health in Age-related Cognitive Decline - A Controlled Trial

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## Abstract

**Background:** Age-related cognitive impairment has a negative impact on mental health in the elderly. Ayurveda Rasayana and yoga positively impact cognition and mental health among the elderly. **Aims:** Present study evaluated the efficacy of Ayurveda Medhya Rasayana (AMR) and Integrated Yoga (IY) on mental health in elderly individuals who had mild cognitive impairment. **Materials and Methods:** This is a three arms-matched control trial. The study involved 72 elderly subjects who had a mild cognitive impairment (MCI). Of these, 25 received IY, 23 received AMR and, 24 persons received combined (IY plus AMR) intervention for 8 weeks. Stress, anxiety, depression, quality of life, and sleep were assessed by using Perceived Stress Scale, Hamilton Anxiety Rating Scale, Geriatric Depression Scale, Quality of Life in the elderly (CASP-19) and Pittsburg Sleep Quality Index respectively at baseline and after eight weeks. **Results:** ANOVA shows significant improvement ($p<0.05$) in quality of life, stress, anxiety, and sleep at eight weeks compared to baseline for all three groups. Depression was significantly improved only in IY plus AMR group. In the between-group comparison, ANCOVA was performed as baseline variable scores were not matched. It shows there was significant difference in groups for stress $F(2, 69) = 6.439 (p<0.003)$, anxiety $F(2, 69) = 7.581 (p<0.001)$ and sleep Quality $(2, 69) = 4.0449 (p<0.022)$. Bonferroni post hoc test shows IY plus AMR significantly better than AMR intervention in improving stress, anxiety, and sleep. **Conclusion:** Combined Ayurveda Medhya Rasayana and Integrated Yoga intervention are better to improve stress, anxiety, and sleep among elderly having mild cognitive impairment than individual treatment. However, further studies are warranted.

**Keywords:** Yoga; Traditional Herbal medicine; Medhya Rasayana; mental health; Brahmi; geriatric care

## 1 Introduction

Mental disorders have become the leading cause of disability across the globe. The aging process involves several changes in physiology and psychology. Studies have reported that a significant portion of the elderly population often experiences poor mental well-being[1]. Further, elderly people are vulnerable to various "chronic disorders" including psychological disorders such as anxiety, depression, and cognitive impairment. Literature shows that approximately 25% of the elderly population suffers from at least one type of psychological issue[2]. A survey study reported the prevalence of anxiety among the elderly population was 17.2%[3]. Another study showed that depression varies from 1% to 38% among the elderly population[4]. Cognitive impairment is another major challenge in old age[5]. Cognitive impairment and mental illnesses have a greater association[6,7]. Anxiety and Depression prevalence are higher in people with Mild Cognitive Impairment and studies reported that the prevalence was 21% and 32% respectively[8,9]. The presence of mental disorders in the elderly often makes the existing physical disorders worst and leads to poor subjective well-being[10]. Prevention of mental disorders among the elderly will be a great benefit in terms of reducing medical costs and disability. So, there is a need to develop safe and cost-effective Integrative interventions to treat multidimensional mental problems. In recent years the use of non-pharmacological treatments like mind-body therapies, herbal medicine, or psychological therapies for mental disorders is increased worldwide[11]. Currently, no conventional guidelines insist on the intervention to prevent mental health problems among the elderly[12].

Ayurveda and Yoga are Indian age-old practices for health and spiritual well-being for humanity. Both the sciences share many common principles. Ayurveda provides a guideline for a lifestyle[13]. Herbs and their formulations are used for treating different diseases[14]. Yoga encompasses a set of physical postures, breathing techniques, and meditation. In recent years, both Ayurveda and Yoga are delivered as complementary and alternative medicine (CAM)[15].

Medhya Rasayana is a subtype of Rasayana (rejuvenation) treatment of Ayurveda used for treating different neuropsychological disorders[16]. A randomized double-blind placebo control study on the extract of Brahmi (*Bacopa monnieri*) (one of the Rasayana herbs) given to the elderly for 12 weeks improved anxiety and depression significantly[17]. Scientific studies on yoga in the elderly have revealed positive effects on mental health, cognition, and in several non-communicable diseases[18,19]. A randomized controlled study (RCT) on elderly people with 12 weeks of yoga intervention improved depression and resilience significantly[20]. Another RCT on old age people were shown significant improvement in self-efficacy in daily living, anger, anxiety, and depression after six weeks of yoga intervention[21]. Ayurveda Meddhya Rasayana and Yoga are complementary sciences by nature that help to strengthen the body and mind. We hypothesize that a combination of both will give greater benefits. Hence this study investigated the combined effect of Integrated Yoga (IY) and Ayurveda Medhya Rasayana (AMR) on mental health among the elderly with cognitive decline.

## 2 Methods

This is a three arms-matched control trial.

### 2.1 Participants

The participants in this study were seniors (aged between 55 to 80 years) with mild cognitive impairment.

### 2.2 Eligibility criteria

Elderly people who can write, read, and understand Hindi and/or English agreed to take part in the study for eight weeks. The study includes people of either gender. Participants were excluded if they had a history of chronic neurologic disease or known psychiatric illness, on antipsychotic medications.

### 2.3 Ethical Aspects

The Swami Vivekananda Yoga Anusandhan Samsthan's institutional Ethical Committee gave its approval to the study. The study's registration number was CTRI/2018/08/015240 with the clinical trials registry of India (CTRI).

### 2.4 Recruitment

Participants were recruited from community residents from Kishangarh city, Rajasthan. Advertisement for recruitment in the study was given in the local newspaper. Pamphlets were circulated in the community. Interested elderly were asked to contact the researcher. Elderly people who were interested were contacted and screened for eligibility. The participants informed written

consent to participate in the study was obtained after they were screened for eligibility. The Montreal Cognitive Assessment (MOCA) was used to screen two hundred and thirty-four volunteers [22]. MCI was present in 100 of the subjects. After baseline screening, 88 participants volunteered to participate in the trial and were assigned to IY group 30, AMR group 30, and IY plus AMR group 28.

## 2.5 Instruments used

### *2.5.1 Screening for mild cognitive decline*

For the screening, MOCA was used. The MOCA was created for the purpose of detecting mild cognitive impairment. It evaluates executive functioning, memory, conceptual thinking, language, visuo-constructional skills, computations, and orientation. The maximum score is 30 points. A score of 26 or higher is deemed normal.

### *2.5.2 Psychological assessments*

The assessment was done for anxiety, depression, stress, sleep and Quality of life. To assess anxiety Hamilton Anxiety Rating Scale (HAM-A) [23] was used. It consists 14 items, and it measures both psychic anxiety and somatic symptoms of anxiety). Depression was assessed by a short version of the Geriatric Depression Scale [24] (GDS) consisting of 15 questions. Perceived stress was assessed by the Perceived Stress Scale [25]. (PSS). Pittsburg sleep quality index (PSQI) [26] was used to assess sleep disturbance, and Quality of life was assessed by using Quality of life in the elderly (CASP-19) [27]. CASP-19 measures four ontologically grounded domains: control, autonomy, pleasure, and self-realization.

## 2.6 Interventions

### *2.6.1 Yoga intervention*

A yoga therapist led 60-minute Integrated Yoga sessions six days a week. For a total of eight weeks. Attendance was recorded in a logbook. Yoga intervention commenced with a prayer followed by loosening practices, Yogic breathing techniques, Asanas, relaxation, pranayama, and meditation. The details are given in Table 1.

**Table 1. Yoga intervention module**

| Category of Yoga Practice | List of the Yoga techniques | Time in minute |
|---|---|---|
| **Session beginning prayer** | Sahanavavatu | |
| **Loosening Practices(Shithilikaran Abhyas)** | Loosening of major joints with focus is practiced daily. Half butterfly, Neck movements, Shoulder rotation, Hand clenching, Elbow bending, Wrist bending, Wrist joint rotation, Waist rotation, Hip rotation, Knee bending, Knee rotation, Ankle rotation | 15 |
| **Breathing Practice(Swasan abhyas )** | Ankle stretch, Hands in and out, Hand stretch breathing | 05 |
| **Yogic body postures (Yoga asanas)** | Two set of Yoga asana were performed on alternate day. **Set 1Standing position**- Pādahastāsana, Aārdhakaṭicakrāsana, Ardhacakrāsana, Trikoṇāsana. **Set 2 Sitting position**- Vakrāsana, Paścimottāṇāsana, Purvottāṇāsana, Bhunamanāsana. **Set 3 Supine position**- Nāvasana, Setubandhāsana, Savāsana, **Set 4 Prone position**- Makarāsana, Bhuja*ṁ*gāsana, Salabhāsana. | 20 |
| **Relaxation** | Deep or quick guided relaxation | 05 |
| **Yogic regulated breathing practice (Pranayama)** | Bhramari, Naadi shudhi pranayama | 10 |
| **Chanting practice** | Nadanusandhana and OM dhyan with chanting | 05 |
| **Ending prayer and resolve (Sankalp)** | *Sarve Bhavanthu* | |

### *2.6.2 Ayurveda Medhya Rasayana (Rejuvenation) intervention*

As a Medhya Rasayana intervention, a polyherbal Ayurvedic formula called Brahmi Ghrita was used [28,29]. It is used in the Ayurvedic medical system to treat a variety of neuropsychiatric disorders. Brahmi Ghrita was prepared as per snehapaka

(oil or ghee-based herbal preparation) process and contents as given in Astanga Hrdayam of Vagbhata[30]. Contents of this preparation are Ghee, Brahmi Swarasa (*Bacopa monnieri*), Trikatu (*Zingier Officinale*, Piper and *Piper nigrum*), Trivrut (*Operculina terpenthum*), Shankhapushpi (*Convolvulus pluricaulis*), Sapthala (*Ophiorrhiza mungos*), Vidanga (*Embelia ribes*). Brahmi Ghrita contains phytoactive principles of these herbs. For eight weeks, a dose of 5 ml was given once a day in the morning on an empty stomach, mixed with 50 ml of hot milk for compatibility. This dose was decided to administer by considering the participant's age and age-associated comorbidities. Every two weeks, participants were contacted by a trained Ayurveda doctor to examine any side effects.

### 2.7 Statistical analysis

Descriptive statistics were calculated using Microsoft excel and paired sample t-test and ANOVA were performed using SPSS version 20.

## 3 Results

At the baseline, all three groups were comparable in terms of age, gender, total years of education, and the number of illnesses. In the IY group, 60 percent, in IY plus AMR group, 75 percent, and in the AMR group 96 percent of subjects were not doing physical activity.

### 3.1 Participation

The study was completed by 72 of the 88 people who were recruited. Due to various personal reasons, 5 individuals in the IY, 6 participants in the IY plus AMR, and 7 participants in the AMR dropped out of the study. Details of the participants were given in Table 2.

**Table 2. Demographic comparisons between groups**

| Group | | IY (n=25) | IY plus AMR (n=24) | AMR (n=23) | F value | P value |
|---|---|---|---|---|---|---|
| Age in years | | 62.40±6.06 | 63.21±6.24 | 64.39±7.15 | 0.569 | .569 |
| Gender | Male | 12 | 13 | 10 | 0.262 | 0.77 |
| | Female | 13 | 11 | 13 | | |
| Education in Years | | 10.24±3.811 | 11.12±3.791 | 9.26±4.213 | 1.317 | 0.275 |
| BMI | | 27.09 ±4.29 | 26.46± 3.37 | 26.36± 5.08 | 0.205 | 0.815 |
| Participants having the number of illnesses | | 1.56±1.12 | 1.67±1.24 | 1.09±1.04 | 1.722 | 0.186 |
| Montreal Cognitive Assessment | | 18.96±3.867 | 18.71±4.016 | 17.96±4.062 | 0.407 | 0.667 |

Statistically significant p-value at<0.05. Values expressed as Mean ± Standard deviation. IY: Integrated Yoga, AMR: Ayurveda Medhya Rasayana.

### 3.2 Within and between-group changes

There was a significant difference ($p<0.05$) in time for all the variables. Bonferroni post hoc test, there was a significant difference in pre to post in all the variables in all groups. While in pre to post comparison, only IY and AR group was not significant for GDS.

3 X 2 ANOVA shows that CASP-19, PSS, HAM-A, GDS, PSQI scores did not match at baseline, hence, ANCOVA was performed. ANCOVA shows a significant difference ($P<0.05$) in the group for PSS, HAM-A, PSQI; Group X time interaction was significant ($P<0.05$) for PSS $F(2, 69)=5.227(p<0.008)$, HAM-A $F(2, 69) = 7.119(p<0.002)$, and PSQI $F(2, 69)= 4.0449$ ($p<0.022$) See Table 3.

Bonferroni post hoc test for CASP and GDS was not significant between groups. While the IY plus AR Vs AR group was significant for PSS, HAM-A, PSQI. This indicates that IY plus AR intervention was significantly better than AR to improve stress, anxiety, and sleep in the elderly with MCI. Whereas there was no significant difference between IY and IY plus AR group for any variable.

**Table 3. Within and between-group comparisons of mental health tests**

| Outcome Measures | Group | Pre mean±SD | Post mean±SD | Percentage Change | Time F(1,69) value, ( P values) | Group F(2,69) value, ( P values) |
|---|---|---|---|---|---|---|
| CASP-19 | IY | 45.16±7.37 | 50.52±6.29** | 11.87 | 200.091 (p<0.001) | 1.719(0.187) |
| | IY plus AMR | 45.58±5.37 | 50.96±4.84** | 11.79 | | |
| | AMR | 40.74±9.41 | 44.70±8.20** | 9.71 | | |
| HAM-A | IY | 15.12±7.35 | 8.56±6.01** | 43.39 | 190.697 (p<0.001) | 6.439(0.003) |
| | IY plus AMR | 15.46±7.34 | 6.71±4.65** | 56.60 | | |
| | AMR | 16.65±8.12 | 12.13±6.28** | 27.15 | | |
| GDS | IY | 11.76±6.75 | 6.68±5.13** | 43.20 | 130.898 (p<0.001) | 7.581(0.001) |
| | IY plus AMR | 13.29±6.23 | 4.46±3.35** | 66.46 | | |
| | AMR | 16.04±10.37 | 10.39±6.89** | 35.23 | | |
| PSQI | IY | 3.12±3.32 | 1.88±2.68 | 39.74 | 10.661 (p=0.002) | 1.717(0.187) |
| | IY plus AMR | 2.88±2.13 | 1.42±1.38$ | 50.72 | | |
| | AMR | 4.96±3.71 | 3.39±2.68 | 31.58 | | |
| | IY | 4.88±2.93 | 3.44±2.14* | 29.51 | 41.154 (p<0.001) | 4.0449(0.022) |
| | IY plus AMR | 6.54±3.37 | 3.92±2.59* | 40.13 | | |
| | AMR | 6.83±3.63 | 5.30±2.57** | 22.29 | | |

$P<0.05, *P<0.01, **P<0.001 pre to post Comparison:Integrated Yoga, AMR: Ayurveda Medhya Rasayana. CASP-19: Quality of Life, PSS: Perceived stress scale, HAM-A: Hamilton Anxiety RatingScale, GDS: Geriatric depression scale, PSQI: Pittsburgh Sleep Quality Index.

## 4 Discussion

This study investigated the effect of eight weeks of intervention of Integrated Yoga, Medhya Rasayana, and a combination of both on mental health among the elderly with MCI. We found significant improvement in Quality of life, stress, anxiety, and sleep in all three groups compared pre- to post-scores. The depression was significantly improved in the Integrated Yoga plus Medhya Rasayana intervention group only. IY, AMR, and IY plus AMR intervention effective in improving mental health in the elderly persons who had MCI. Further, between groups, comparisons showed that the combination of integrated yoga and Medhya Rasayana was significantly better than only Medhya Rasayana intervention for improving stress, Anxiety, and Quality of sleep in the elderly. This suggests that integration of Yoga and Ayurveda is better than individual treatment for mental health in the elderly with MCI. Psychological problems affect the overall well-being and influence the outcome of physical illness in the elderly. Psychological ill-health is positively associated with cognitive impairment and worsens the condition further, it leads to dependency for daily activities and poor Quality of life. To treat such a problem, need a multidisciplinary approach. In our study, we found the integration of Yoga and Medhya Rasayana treatments is better than individual treatment for stress, anxiety, and sleep in the elderly with MCI.

Previously, a study by Mishra D et al, 2019, on adults with essential hypertension with the intervention of Brahmi vati 500 mg two times per day for four weeks found a significant improvement in anxiety and sleep [31]. In our study, we found similar benefits on anxiety and sleep with Brahmi Ghrita with a 5ml dose after eight weeks. Another study conducted by Roodenrys S. et al, 2002, on mid-aged adults, given a capsule of Brahmi extract 300 mg per day for twelve weeks, but there was no significant improvement in anxiety, depression, and stress [32]. Both the previous studies are on the adult population. In our study, by giving Brahmi Ghrita to elderly people with MCI there was a significant improvement in old age-related Quality of life, Anxiety, stress, and sleep.

A study by Bonura KB et al, in 2014 reported that Yoga intervention for six weeks significantly improved Anxiety, depression, and Quality of life in the elderly compared to control [33]. Similar benefits of yoga practice were obtained in our study also. In the previous study, a weekly once 45-minute contact yoga class was conducted while on non-class day 15-minute home practice was advised to participants, and yoga intervention was sitting on a chair (chair yoga). Whereas in our study, weekly six classes

of 60-minute duration were conducted and integrated yoga intervention was with complete active participation was given to the elderly with MCI. Another study conducted by Ramanathan M et al, in 2017 on elderly women leaving in hospice reported that weekly twice 60-minute yoga practice for 12 weeks significantly improved anxiety and depression [34]. These findings are similar to our outcomes.

In the elderly higher psychological distress is associated with smaller hippocampal volume [35]. A study done by Hariprasad V R et al, in 2013 Yoga practice increases the hippocampal volume among the elderly; this might be one of the mechanisms that improve mental health [36]. Mechanism of yoga to improve psychological well-being through down-regulation of the hypothalamic-pituitary-adrenal axis, increasing gamma-aminobutyric acid (GABA) levels, vagal tone, and serum prolactin, and decreasing serum cortisol levels [37]. Yoga Practice also increases body awareness and mindfulness, which helps to improve psychological well-being [38]. The mechanism of Bramhi in mental health is not clear but studies done on rats demonstrated that Brahmi extract acts as an antioxidant in the hippocampus which may facilitate the hippocampal functions [39]. The present study has a few methodological limitations such as low sample size, non-RCT study, lack of objective variables, and short-term intervention.

## 5 Conclusion

Combined Ayurveda Medhya Rasayana and Integrated Yoga intervention are better to improve stress, anxiety, and sleep among elderly having mild cognitive impairment than individual treatment. However, further studies are warranted.

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