



**WATER AND ENVIRONMENT DEVELOPMENT
OEGANIZATION (WEDO)
KOZHIKODE
KERALA, INDIA**

January 2018

ANNUAL REPORT 2017

Name of the NGO: Water and Environment Development Organization (WEDO)

Address: 28 / 566, Poornima, Ayyappa Nagar, Chevayur, Kozhikode - 673 017, Kerala State, India

Details of Registration: Reg. No. KKD / CA / 1074 / 2015 Dated 15-12-2015 of the Registrar of Society, Dept. of Registration, Kozhikode, Kerala (Renewed during 2017)

Office Bearers

President: Dr. George Mammen

Vice President: Sri. T. Valsan

Secretary: Sri. M.T Anilkumar

Joint Secretary: Sri. V. Aravindakshan

Treasurer: Sri. V. Radhakrishnan

Executive Members:

Sri. E. Balakrishnan Nair

Sri. Jayaprasaad. K. M.

Sri. V. Sundararajan

Objectives

The main objectives of WEDO are to promote water conservation, development and management programs for ensuring adequate water of good quality for people. Awareness programs, rain water harvesting, water management for domestic / agricultural purposes, water purification, establishment and maintenance of water storage / conveyance structures, providing water literacy for children, skill development training on water resources development / management etc. are envisaged for realizing this objective

Other objectives include promotion of sustainable organic farming, scientific environment friendly natural resources management, forestry development, scientific waste management, generation of data bank on water and other natural resources, promotion of physical and mental development of children, providing assistance to poor for treatment of chronic ailments, promoting voluntary blood donation, women empowerment programs, development of public consciousness on social evils like drug abuse, alcoholism, AIDS etc., promotion of HRD and institution building programs, provision of health awareness programs, promotion of Yoga, Meditation, Art of living and other mind-body relaxation techniques etc.

Activities undertaken

The activities undertaken by WEDO during 2017 are shown below

I. Organic farming of vegetables

Concept of organic farming

Even though vegetables are available in Kerala from other states, extensive use of plant protection chemicals, including systemic insecticides like Carbofuran, Porate, Dimethoate and Dimecron on them has lot of health implications. Over use of chemical fertilizers for vegetables is also hazardous. Now a days, chemicals are used to prolong the shelf life of vegetables, which is also creating serious health problems. Organic farming without chemical fertilizers and pesticides is an alternative to this. Only organic pesticides, fungicides and fertilizers are used in organic farming. Organic vegetables fetches more price in the market. Even though, organic vegetables are available in the market, because of high return vegetables grown with fertilizer and pesticide are also sold under organic vegetable label. Solution for this is growing in our own home.

In India, organic farming has been followed from ancient times mainly using organic manures available under the livestock based farming system prevalent then. It is a method of farming system which primarily aimed at cultivating the land and raising crops in such a way, as to keep the soil alive and in good health

by use of organic wastes (crop, animal and farm wastes, aquatic wastes) and other biological materials along with beneficial microbes (bio fertilizers) to release nutrients to crops for increased sustainable production in an eco friendly, pollution free environment. As per the definition of the United States Department of Agriculture (USDA) study team on organic farming, it is a system, which avoids or largely excludes the use of synthetic inputs (such as fertilizers, pesticides, hormones, feed additives etc) and to the maximum extent possible, relies on crop rotations, crop residues, animal manures, off-farm organic waste, mineral grade rock additives and biological system of nutrient mobilization and plant protection. FAO has suggested that organic agriculture is a unique production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles and soil biological activity, and this is accomplished by using on-farm agronomic, biological and mechanical methods in exclusion of all synthetic off-farm inputs.

WEDO laid out a plot on organic farming along with scientific water management for irrigated vegetables during 2017 summer season in 40 cents plot near Peringolam, in Kunnamangalam Panchayath, Kozhikode District for highlighting their advantages. About 500 people visited the demonstration plot and showed keen interest in the practices followed in organic cultivation. This is expected to help in effectively transferring the technology to people.

Details of organic farming of vegetables

Trichoderma culture obtained from the Indian Institute of Spices Research (IISR), Kozhikode was cultured in farm yard manure after mixing with Neem cake. This was used for raising the nursery for Brinjal, Chillies, Amaranthus and Tomato and basal dose of manures for the crops raised in the field. The field was prepared for planting Chillies, Brinjal, Tomato, Cowpea and Ladies finger.

Transplanting of seedlings was done after 30 days of sowing. The spacing adopted was 60cm x 45 cm for chillies, 60cm x 45 cm for Brinjal, 30cm x 30 cm for Amaranthus, 45cm x 45 cm for Tomato, Direct sowing of Ladies Finger was done at 30cm x 30cm spacing and Cow Pea at 45cm x 45 cm.

Fermented Neem cake, Fermented Neem cake + FYM, Fish Amino acid, Cow dung fermented, Amirth pani (cow dung + fresh cow urine + Honey + Ghee) and humic acid were used as organic manure. They were applied at weekly interval. Plant protection was done using Beveria and Verticillium. Plant diseases were controlled using PGPR mix II.

Scientific irrigation was carried out through conventional surface method thrice a week based on the suggestions obtained from Centre for Water Resources development & Management (CWRDM), Kozhikode through

Yield of Vegetables

Table 1 shows the yield obtained for different vegetables under organic farming from the plot. When compared with the yield potential of vegetables reported by VFPCCK (the average value of the yield range reported is considered), it can be made out from the table that under organic cultivation, Brinjal, Tomato, Chillies, Ladies finger, Amaranthus and Cow pea gave yield equivalent to 82 %, 73 %, 78 %, 82 %, 71 % and 73 % of the potential yield of the crops respectively (Table 1)

This is a good trend, since, the experience of farmers generally show that it will take two or three crop seasons before a significant yield improvement can be noticed under organic cultivation.

Table 1. Yield of vegetables under irrigated organic cultivation

Sl. No	Crop	Average yield reported under good management* (Tons/ha)	Yield obtained from WEDO organic farming plot	
			On tons / ha basis	as % of yield reported by VFPCCK
1	Brinjal	22	18	82
2	Tomato	22	16	73
3	Chillies	09	07	78
4	Ladies finger	17	14	82
5	Amaranthus	17	12	71
6	Cow Pea	15	11	73

*as per data of Vegetable and Fruit Promotion Council Kerala (VFPCCK)

II. Awareness classes on

Water Resources Management

WEDO conducted the following awareness programs on water resources management during 2017:

- a. Artificial well recharging techniques and Wick irrigation for potted plants in August for the members of Poonkavanam Residents Association, Chevayur, Kozhikode. About 50 people participated
- b. Artificial well recharging techniques and Wick irrigation for potted plants in November 2017 for the members of Kavuv Residents Association, Chevayur, Kozhikode. About 40 people participated. in the program
- c. Artificial well recharging techniques in December 2017 for the members of Sun Rise Residents Association, Mukkam, Kozhikode.

Sri T. Valsan and Sri K.M. Jayaprasad, Retired Senior Technical Officers of CWRDM, Kozhikode took classes and demonstrated wick irrigation, which works

on the principle of capillarity to provide water to the soil from a water source using wick made out of glass wool to the participants.

Yoga and Health

Sri V. Sundararajan, Executive Member, WEDO conducted an awareness cum demonstration program on Yoga for the members of “Tarangam”, the cultural organization of the research institution- Centre for Water Resources development & Management (CWRDM), Kozhikode in connection with the International Yoga Day on 21st June 2017

III. Research on Yoga

WEDO carried out research on the effects of yoga on health among yoga practitioners in Kozhikode District. For this, the assistance of Dr. K. Madhava Chandran, Social Scientist from Kozhikode was obtained. Sri. V. Sundararajan, Yoga Instructor and Executive Member of WEDO was also involved in the studies.

The details are shown below

Yoga has been scientifically established as an alternate system of medicine, effective in eliminating many diseases / problems of people. A survey among 3000 yoga practitioners with various health ailments conducted during 1983-84 by Yoga Biomedical Trust revealed that respondents in the range of 68 to 100% experienced positive benefit through yoga for various life style diseases like BP, Diabetes, back pain, Arthritis, Anxiety, Migraine, Insomnia, Nerve or muscle disorders, menstrual problems, Heart diseases, Asthma or Bronchitis, Duodenal ulcers, Hemorrhoids, Obesity, cancer, Tobacco addiction and alcoholism (accessed from www.holisticonline.com/Yoga/hol_yoga_benefits.htm on 11th March 2017)

In the light of such findings, WEDO carried out a study on yoga with the following objectives:

1. To study the effect of yoga on various health problems faced by people
2. To analyze the “Mental State” achieved through the practice of yoga by people

3. To study the constraints, if any, in practicing yoga

Methodology of the study

The study was carried out among a random sample of 100 people practicing yoga in Kozhikode. This includes people practicing yoga for a period of 6 months to more than 20 years. Data was collected from them using a structured interview schedule (questionnaire), which listed the following health problems:

- a. BP
- b. Diabetes
- c. Cholesterol
- d. Heart problems
- e. Back pain
- f. Knee pain
- g. Neck pain
- h. Disc problem
- i. Spondulitis
- j. Asthma
- k. Respiratory problem
- l. Headache
- m. Migraine
- n. Gastric problems
- o. Skin diseases
- p. Allergy
- q. Tension & other mental problems
- r. Insomnia (Sleeplessness)
- s. Memory Loss
- t. Lack of Concentration

The respondents were asked to give their responses as follows:

- 1. Tick the health problems they have faced
- ii. Whether they were taking medicines or undergoing treatment for the problem
- iii. Whether yoga practice has helped them to reduce the concerned health problem more, when compared to a condition of taking treatment / medicines only, or when

compared to no treatment / medicines (in case they were not taking any treatment or medicines for the problem)

- iv. How they came to understand that the problem has reduced through yoga practice. For this question, the respondents were given three choices, namely, through medical test, through experience, through any other means / method (respondent was asked to mention the means / method)

The interview schedule also contained the following questions (a, b and c) and responses for them as shown below

- a. How much has yoga contributed to improve their “Mental State” (indicates psychological condition of the mind)
- i. Maximum improvement
 - ii. Good improvement
 - iii. Slight improvement
 - iv. Not much improvement
 - v. No improvement at all
- b. Considering the past one month, what period of time (on an average) were they able to experience the improvement in “mental state” mentioned above
- i. > 90 % of time
 - ii. 75 to 90% of time
 - iii. 50 to 75% of time
 - iv. 25 to 50% of time
 - v. < 25% of time

A scoring pattern of 5, 4, 3, 2, and 1 was adopted for the five responses under questions a and b shown above

- c. Constraints, if any, they have experienced in practicing yoga

The data was analyzed using statistical techniques such as Analysis of Variance (ANOVA) and *t* test

Results and Discussion

Improvement in health problems through the practice of yoga

It can be made out from Table I that, when compared to a condition of taking treatment / medicines only or without treatment, yoga has helped in improvement (implies reduction) for majority of the health problems for 70 to 100% of the people. This is a very promising result. In the case of heart problems, about 67% and for skin diseases, 50% of people only have reported improvement through yoga. Table I reveals that for Fits, Ulcer and Cold, improvement has not been experienced by the yoga practitioners.

For most of the health problems, all the yoga practitioners have observed improvement through their own experience. However, in the case of BP, Diabetes, Cholesterol, Heart problems, Thyroid and Fibroid, all the yoga practitioners report that improvement was seen through medical tests (Table I).

The percentage of people taking treatment or medicines now (when compared to the earlier period) has reduced considerably for all the health problems which have improved through the practice of yoga (Table I). This indicates the effectiveness of yoga practice in reducing medical treatment for various health problems.

Table I. Improvement in health problems due to the practice of yoga

Sl. No.	Health problem	No. of people who report the problem	% of people who report taking treatment or medicines for the problem earlier	% of people who report taking treatment or medicines for the problem now	% of people who report improvement* in the problem through practice of yoga (when compared to taking treatment / medicines only or without treatment)	How they understood that it has improved (Figure in bracket shows % of people reporting)
1	BP	27	74.1	55.6	70.4	Through medical test (100)
2	Diabetes	25	84	64	80.0	Through medical test (100)
3	Cholesterol	25	72	44	80.0	Through medical test (100)
4	Respiratory problem	7	100	28.6	85.7	From experience (100)
5	Spondulitis	9	44.4	nil	100	From experience (100)
6	Headache	23	78.3	4.3	100	From experience (100)

7	Migraine	8	50	nil	75.0	From experience (100)
8	Memory problem	19	57.9	15.8	78.9	From experience (100)
9	Concentration problem	11	45.5	9.1	81.8	From experience (100)
10	Neck pain	18	44.4	nil	94.4	From experience (100)
11	Knee pain	28	60.7	7.1	100	From experience (100)
12	Back pain	35	68.6	8.6	100	From experience (100)
13	Shoulder pain	2	100	nil	100	From experience (100)
14	Allergy	11	72.7	18.2	90.9	From experience (100)
15	Asthma	5	80	20	80.0	From experience (100)
16	Gastric problems	24	58.3	20.8	95.8	From experience (100)

17	Sleep disorders	25	52	32	72.0	From experience (100)
18	Hernia	1	nil	nil	100	From experience (100)
19	Skin diseases	10	90	50	50.0	From experience (100)
20	Heart problems	9	66.7	55.6	66.7	Through medical test (100)
21	Tension	9	55.6	44.4	88.8	From experience (100)
22	Disc problem	4	100	25	100	From experience (100)
23	Fear	1	nil	nil	100	From experience (100)
24	Anger	1	nil	nil	100	From experience (100)
25	Burning sensation of the body	1	nil	nil	100	From experience (100)
26	Fits (epilepsy)	1	100	100	nil	From experience (100)

27	Foot joint pain	1	nil	nil	100	From experience (100)
28	Varicose vein	2	50	nil	100	From experience (100)
29	Thyroid	2	50	nil	100	Through medical Test (100)
30	Fibroid	1	nil	nil	100	Through medical test (100)
31	Menstrual problems	1	100	nil	100	From experience (100)
32	Ulcer	1	100	nil	nil	From experience (100)
33	Cold	1	100	100	nil	From experience (100)
34	Vertigo	1	nil	nil	100	From experience (100)
35	Lack of self confidence	1	nil	nil	100	From experience (100)

*Improvement implies reduction in the problem

Column 2 in Table II shows the range (in percentage) of health problems improved through the practice of yoga for different periods. Considering the mean (average) percentage of health problems improved (column 3 in Table II), it can be inferred that about 73 to 100% of health problems have improved through yoga practice for a period ranging from less than one year up to twenty years

Table II. Improvement in health problems through the practice of yoga

Period of yoga practice (years)	Range (in percentage) of health problems improved through yoga practice, when compared to treatment or medication only / no treatment	Mean (average) percentage of health problems improved through yoga practice, when compared to treatment or medication only / no treatment
< 1	0 (no improvement) to 100	85.2
1	60-100	81.8
2	20-100	92.5
3	83.3-100	94.4
4	87.5-100	96.9
5	50-100	83.3
6	33.3-100	73.3
8	75-100	87.5
10	100	100
12	100	100
14	100	100
15	100	100
16	100	100
17	100	100
18	100	100
20	87.5-100	95.8
>20	100	100

The mean (average) score for improvement in health problems under different categories of yoga practice was worked out by dividing the mean (average) percentage of health problems improved for people under the concerned period of yoga practice by 100.

For doing statistical analysis through t test, a minimum period of up to 6 months of yoga practice was initially considered as the base category. The mean score for improvement in health problems for this category was compared with the mean score of 6 months to 1 year, and 1 to 2 years yoga practice. However, the results showed that there was no statistically significant difference in the mean scores of the categories mentioned above (Data not shown in this report).

Hence, it was decided to do t test of the mean scores after grouping them under two year interval yoga practice categories, as shown in Table III. However, here also, no statistically significant difference in the mean scores for improvement in health problems was observed between any of the yoga practice categories (see column 3 in Table III). This indicates that more number of years of yoga practice is not contributing to any statistically significant improvement in health problems for the practitioners, when compared to lesser years of yoga practice. However, it may be observed from Table III that, for people with more than 8 years of yoga practice, the mean score is mostly 1, indicating that there is improvement in all their health problems through yoga, when compared to taking treatment / medicine only, and compared to no treatment state.

But it should also be noted that a mean score of 0.87 for up to two years yoga category (which includes people practicing yoga for a period of less than two years, but up to a maximum of two years only) shown in column 2 of Table III indicates that, on an average, 87% of health problems have been improved for people doing yoga for a period of up to two years. From this, it may be concluded that even two years and less of yoga practice can contribute to good improvement in health problems

Table III. Score for improvement in health problems through practice of yoga

Category of period of yoga practice (years)	Mean score* for improvement in health problems through yoga practice when compared to treatment or medication alone / no treatment	Remarks
Up to 2	0.87	<i>t</i> test of the mean score of up to two years and 2-4 years yoga categories is NS**
2 - 4	0.90	<i>t</i> test of the mean score of 2-4 and 4-6 years yoga categories is NS**
4-6	0.78	<i>t</i> test of the mean score of 4-6 and 6-8 years yoga categories is NS**
6-8	0.88	<i>t</i> test of the mean score of 6-8 and 8-10 years yoga categories is NS**
8-10	1.0	<i>t</i> test of the mean score of 8-10 and 10-12 years yoga categories is NS**
10-12	1.0	<i>t</i> test of the mean score of 10-12 and 12-14 years yoga categories is NS**
12-14	1.0	<i>t</i> test of the mean score of 12-14 and 14-16 years yoga categories is NS**
14-16	1.0	<i>t</i> test of the mean score of 14-16 and 16-18 years yoga categories is NS**
16-18	1.0	<i>t</i> test of the mean score of 16-18 and 18-20 years yoga categories is

		NS**
18-20	0.96	<i>t</i> test of the mean score of 18-20 and >20 years yoga categories is NS**
>20	1.0	

* Worked out by dividing the mean (average)percentage of health problems improved through yoga practice by 100

** NS indicates that No Statistically significant difference exists between the mean score of the two categories

Improvement in “Mental State” through the practice of yoga

Level of improvement and time period of improvement in “Mental State”

Table IV shows the level of improvement in the “Mental State” of people through the practice of yoga. “Mental State” indicates the psychological condition of the mind.

It can be made out from Table IV that, while about 45 % of women report maximum improvement in their mental state through the practice of yoga, only about 21% of men report maximum improvement. Most of the men (about 42%) are reporting good improvement in mental state only. It should be noted from Table IV that a good proportion (34%) of women also report good improvement in their mental state through yoga practice

It is also evident from Table IV that many male practitioners (about 35%) have experienced only slight improvement in their mental state. However, in the case of women, only about 19% report that they have got slight improvement only

It can be seen from Table V that the proportion of men and women experiencing improvement in mental state for more than 90 per cent of time through practice of yoga is more or less equal. However, while 34% of women experience improvement in their mental state for 75 to 90% of time, only 18.6 % of men experience improvement for this period of time. 39.5 % of men report improvement in mental state for 50 to 75% of time

only (Table V), while, the proportion of women reporting improvement for this period of time is comparatively less (32.1 %)

Table IV. Level of improvement in the mental state of people through practice of yoga

Level of improvement in the mental state of people through practice of yoga	% of people reporting	
	Men	Women
Maximum improvement	20.9	45.2
Good improvement	41.9	34.0
Slight improvement	34.9	18.9
Not much improvement	2.3	1.9
Total	100	100

Table V. Time period for which improvement in mental state is experienced through practice of yoga

Time period for which improvement in mental state is experienced through practice of yoga	% of people reporting	
	Men	Women
> 90 % of the time	16.3	15.0
75 – 90% of the time	18.6	34.0
50 – 75% of the time	39.5	32.1
25 – 50% of the time	20.9	18.9
<25 % of the time	4.7	nil
Total	100	100

Table VI shows the mean (average) score obtained by men and women for the level of improvement in mental state through the practice of yoga. The score for women is 4.23, while for men, it is only 3.78. Table VI also shows that there is a statistically significant difference between the mean score of women and men.

Table VI. Score of men and women for the level of improvement in mental state through practice of yoga

Mean score for improvement in the mental state through practice of yoga	
For Men	For Women
3.78	4.23
$t = 2.607$ (Statistically significant at 0.01)	

From the above discussion, it may be concluded that, when compared to men, women are able to achieve better improvement in their mental state through the practice of yoga. Women could be more disposed to worries and tension in their day to day lives due to factors such as more responsibilities at home / towards bringing up their children etc. Factors such as involvement in routine household activities (which may become monotonous and boring after some time), lack of adequate time and space for social interaction with family members / friends, discomfort during menstrual periods etc. can all make women more physically and psychologically disadvantaged than men. Under such situations, mind-body relaxation techniques such as yoga could probably have more effect on women than men

It is evident from Table VII that there is no statistically significant difference in the mean score of men and women for the time period of improvement in mental state through the practice of yoga. The scores also do not differ much numerically (Table VII)

Table VII. Score of men and women for time period of improvement in mental state through practice of yoga

Mean score for time period of improvement in the mental state through practice of yoga	
For Men	For Women
3.21	3.44
t value considering the above mean scores is not statistically significant	

Table VIII shows the mean (average) score of people for the level of improvement in their mental state under different periods of yoga practice. It may be noted that some of the years of yoga practice are not available in the sample of 100 people studied under

this project. The maximum possible (attainable) mean score is 5, if all the people in this study had reported that they have achieved maximum improvement in their mental state. It can be made out from the last row in Table VIII that the average score (for level of improvement in the mental state) of all the 100 people surveyed in this study across various periods of yoga practice is 3.93, which is equivalent to 78.6% of the maximum possible score of 5. This means that about 79% of the maximum possible level of improvement in mental state has been achieved by people through the practice of yoga

Table VIII shows that majority of the scores of people lie within the range of 3.67 to 5 under different years of yoga practice. Statistical test through Analysis of Variance (ANOVA) of the mean scores (for different years of yoga practice) is non-significant (Table VIII). It may be observed from Table IX that, analysis of the mean scores (for the level of improvement in mental state) after grouping them under five year yoga practice categories also does not exhibit statistically significant difference. Hence, the above mentioned findings indicate that, irrespective of the years of yoga practice, people are able to achieve good improvement in their mental state or psychological condition of the mind. As discussed earlier in this report, more number of years of yoga practice was also not found to contribute to any statistically significant improvement in other health problems such as BP, Diabetes, Cholesterol, Back pain, Neck pain, Knee pain, Shoulder pain, Headache, Migraine etc., when compared to lesser periods of yoga practice categories

Table VIII. Score for improvement in mental state of people through practice of yoga for different periods

Period of yoga practice (years)	Mean score for improvement in mental state through practice of yoga	Remarks
Up to 1	3.83	Statistical test through Analysis of Variance (ANOVA) of the mean
1 to 2	4.33	
2 to 3	4.00	

3 to 4	3.83	scores across various years of yoga practice is Non Significant
4 to 5	3.67	
5 to 6	4.00	
7 to 8	4.50	
9 to 10	4.40	
11 to 12	4.50	
13 to 14	5.00	
14 to 15	3.50	
15 to 16	4.00	
16 to 17	5.00	
17 to 18	4.00	
19-20	4.30	
> 20*	4.00	
Mean score (considering the entire sample of 100 people coming under various years of yoga practice)	3.93	

*Only one person (with 30 years of yoga practice) is available in this group

Table IX. Score for improvement in mental state of people under five year yoga practice

Categories of yoga practice (years)	Mean score for improvement in mental state through the practice of yoga	Mean score expressed as % of the maximum possible score of 5	Remarks
Up to 5	3.9	78.0	Statistical test through Analysis of Variance (ANOVA) of the mean scores across these categories of years of yoga practice is Non Significant
5 to 10	4.3	86.0	
10 to 15	4.3	86.0	
15 to 20	4.3	86.0	

Table X shows the score of people for time period of improvement in mental state under different periods of yoga practice. The maximum possible mean score is 5, if all the people in this study had reported that they have achieved improvement in mental state for more than 90% of the time.

It can be made out from the last row in Table X that the average score (for time period of improvement in mental state) of all the 100 people surveyed in this study is 3.85, which is equivalent to 77% of the maximum possible score of 5. This means that 77% of the maximum possible time period of improvement (in mental state) has been achieved by the yoga practitioners. In this study, the maximum possible (attainable) time period of improvement in mental state is more than 90% of the time

The mean (average) score (for time period of improvement in mental state) shown in Table X ranges from 3 to 5. Analysis of Variance (ANOVA) of the mean scores (given in Table X) shows that there is no statistically significant difference between the scores (for time period of improvement in mental state) among different years of yoga practice.

However, analysis of the mean score of people grouped under five year yoga practice category shows F value of 3.36, which is statistically significant (Table XI). With critical difference (CD) value of 0.80 and considering the mean scores shown in Table XI, it can be concluded that there is significant difference in the mean score for time period of improvement in mental state between up to 5 years yoga practice category and 15 to 20 years category only. The mean score (for time period of improvement in mental state) of up to 5 years, 5 to 10 years and 10 to 15 years of yoga practice do not differ statistically

Table X. Score for time period of improvement in mental state of people through practice of yoga for different periods

Period of yoga practice (years)*	Mean score for time period of improvement in mental state through practice of yoga (out of maximum possible score of 5)	Remarks
Up to 1	3.02	Statistical test through Analysis of Variance (ANOVA) of the mean scores across various years of yoga practice is Non Significant
1 to 2	3.43	
2 to 3	4.00	
3 to 4	3.17	
4 to 5	3.00	
5 to 6	3.00	
7 to 8	4.00	
9 to 10	4.00	
11 to 12	3.50	
13 to 14	5.00	
14 to 15	3.50	
15 to 16	5.00	
16 to 17	5.00	

17 to 18	4.00	
19-20	4.00	
> 20	4.00	
Mean score considering the entire sample of 100 people	3.85	

*Some of the years of yoga practice are not available in the sample of 100 people studied

Table XI. Score for time period of improvement in mental state of people under five year yoga practice categories

Categories of yoga practice (years)	Mean score for time period of improvement in mental state through practice of yoga	Mean score expressed as % of the maximum possible score of 5	Remarks
Up to 5	3.2	64.0	Statistical test through Analysis of Variance (ANOVA) shows F value of 3.36, which is significant at $p < 0.05$ CD = 0.80
5 to 10	3.7	74.0	
10 to 15	3.8	76.0	
15 to 20	4.3	86.0	

In a study conducted by Patanjali Yoga Research Centre, Kozhikode, Kerala, India on the well being of 100 yoga practitioners analyzed based on the parameters suggested by OECD (2013), the results revealed positive effect of yoga on various well being parameters, when compared to people who do not practice yoga.

The purpose of mentioning this here is to support the results of the present study, which also shows that yoga helps to improve the “mental state” (psychological condition of the mind) of yoga practitioners.

Constraints in practicing yoga

Table XIII shows the constraints reported by people in practicing yoga. Out of 100 people studied under this project, only 70 have reported constraints.

It can be made out from the constraints shown in Table XIII that 61.4% of people do not get adequate time to practice yoga, while 38.5% report laziness felt by them as a constraint in practicing yoga. The other three constraints, namely, health problems, lack of interest due to non realization of benefits of yoga, and tension have been reported by only a very small percentage of the yoga practitioners.

With regard to the problem of time availability, if people take a strong decision to make yoga part of their life, similar to taking food, having bath, watching TV for long hours etc., the constraint of lack of time to do yoga can be definitely overcome by them. Similarly, one of the main reasons for the problem of laziness reported by some of the yoga practitioners is that they do not value the importance of yoga in their lives. It is surprising that, even with improvements in health problems and mental state experienced by the people in this study, some of them feel lazy to practice yoga.

Based on the analysis of constraints reported by the yoga practitioners, it is suggested that yoga centers should consider formulating effective yoga training programs of shorter time period than the usually existing one hour duration, in order to overcome the time constraints of yoga practitioners. More awareness programs, demonstrations, seminars etc. should be conducted among different cross sections of people to make them understand the value of yoga in promoting physical and psychological health. Providing the results generated from research projects carried out on yoga will also help to motivate people to study and continue yoga in their daily lives.

Table XIII. Constraints in practicing yoga

Constraint reported by the yoga practitioners	No. of people reporting	% of people reporting
Lack of adequate time to practice yoga	43	61.4 [*]
Laziness	27	38.5 [*]
Some health problems	6	8.6 [*]
Lost interest in yoga because I did not get sufficient benefits through yoga	1	1.4 [*]
Tension	1	1.4 [*]
No constraint	30	30 ^{**}

*Out of 70 yoga practitioners who have reported various constraints

** Out of the total sample of 100 yoga practitioners surveyed using questionnaire

Conclusions of the study

1. When compared to a condition of undergoing treatment / taking medicines only or without treatment, yoga has helped to improve the health condition by reducing majority of the health problems for 70 to 100% of the yoga practitioners.
2. About 73 to 100% of the health problems have been reduced through the practice of yoga for a period ranging from less than one year up to twenty years.
3. All the yoga practitioners have reported improvement (implies reduction) in most of the health problems through their own experience. However, for BP, Diabetes, Cholesterol, Heart problems, Thyroid and Fibroid, all the yoga practitioners report that improvement was evident based on medical tests.
4. For all the health problems which have improved through yoga, the number of people taking treatment or medicines has reduced considerably. This indicates the effectiveness of yoga in reducing medical treatment for health problems.

5. More number of years of yoga practice was not found to contribute to any statistically significant improvement in health problems for the practitioners, when compared to lesser years of yoga practice. About 87% of the health problems have been improved even through yoga practice for a period of up to two years.
6. With respect to improvement in the “mental state” of people (which indicates the psychological condition of the mind), while about 45 % of women report maximum improvement, only about 21% of men report this level of improvement through the practice of yoga.
7. Regarding the time period for which the improvement in mental state is experienced, 34% of women experience it for 75 to 90% of the time. However, only 18.6 % of men experience the improvement for this much period of time.
8. The mean (average) scores of women and men for their level of improvement in mental state through the practice of yoga are 4.23 and 3.78 respectively, which also exhibit statistically significant difference.
9. The results indicate that women are able to achieve better improvement in their mental state through the practice of yoga than men. Factors such as more worries and tension in their day to day lives on account of responsibilities at home / towards bringing up their children, involvement in routine household activities which may become monotonous and boring after some time, lack of adequate time and space for social interaction with family members / friends, discomfort during menstrual periods etc. can all make women more physically and psychologically disadvantaged than men. Under such situations, mind-body relaxation techniques such as yoga could probably have more effect on women than men.

10. Considering the entire sample of people studied under this project, an average of 79% of the maximum possible level of improvement in the mental state has been achieved by people through the practice of yoga for different periods.
11. Since statistical test of the scores for the level of improvement in mental state under different periods of yoga practice was not significant, it implies that, irrespective of the number of years of yoga practice, people are able to achieve good improvement in their mental state.
12. The positive results of a study conducted by Patanjali Yoga Research Centre, Kozhikode on the influence of yoga on well being of people (analyzed from a psychological perspective) also support the findings of the present study on mental state improvement (which indicates the psychological condition of the mind) through yoga.
13. In the present study, the maximum possible (attainable) time period of improvement in mental state considered is more than 90% of the time. Considering the entire sample of people studied under this project, an average of 77% of the maximum possible time period of improvement has been achieved through the practice of yoga for different periods.
14. Analysis of the mean scores (for time period of improvement in mental state), when grouped under five year yoga practice categories, shows that there exists statistically significant difference in the mean scores between up to 5 years and 15 to 20 years categories of yoga practice. The mean scores of up to 5 years, 5 to 10 years and 10 to 15 years categories do not vary statistically.
15. Out of 100 people studied under this project, only 70 have reported constraints in practicing yoga. 61.4% of the people, who report constraints do not get sufficient time to practice yoga, while 38.5% report laziness as a problem in practicing yoga. The other constraints, namely, health problems, lack of interest due to non realization of benefits of yoga, and tension have been reported by only a very small percentage of the yoga practitioners.

Suggestions based on the study

1. If people take a strong decision to make yoga as a routine part of their life, similar to taking food, having bath, watching TV etc., the constraint regarding lack of time to do yoga (which has been reported by some people in this study) can be overcome.
2. It will be worthwhile if yoga centres formulate effective yoga training programs of shorter duration than the usually existing one hour duration in order to overcome the time constraint experienced by yoga practitioners.
3. It is surprising that, even with good improvements in health problems and “mental state” experienced by the yoga practitioners in this study, some of them report laziness as a constraint in practicing yoga. Feeling of laziness is mainly because they do not value the importance of yoga in their lives. In this context, in addition to classes on yoga practice, yoga centres should provide proper awareness on the beneficial effects of yoga for people to realize its effectiveness. Making available the results generated from research projects carried out on yoga in yoga classes, seminars etc. will also be useful. The personal experience of the investigators of this research project shows that many people are not properly aware of yoga and its benefits.
4. Yoga practitioners should necessarily do yoga nidra, which is an essential component of yoga for relaxing the mind and body. Yoga nidra helps to reduce negative thoughts and increases the capacity of the subconscious mind to accept positive thoughts. This will ultimately improve the psychological condition of the mind.
5. In addition to promoting research on yoga by academic and research institutions, Government should encourage yoga training centers also to carry out relevant studies on yoga. This will help to develop a useful data base on various aspects of yoga from

different parts of the country, which can be put on a web portal for dissemination and interaction. Similarly, facilities can be provided by the Government to conduct seminars and workshops involving various yoga centers, in order to share their experience and findings of research carried out.

6. Establishment of Yoga Universities at the Government level should be considered for promoting education and research.
7. A Yoga Department may be established in hospitals, especially in Ayurveda hospitals. The Department can provide awareness on yoga and yoga therapy for the patients.
8. It will be worthwhile to conduct yoga training for students and establish a library on yoga in schools and colleges. Similarly, giving awareness on proper diet to students practicing yoga will be useful to realize the beneficial effects of yoga.
9. The Department of Sports under the Government can incorporate yoga as one of their activities.
10. The local self government institutions such as panchayaths, municipalities etc. can promote yoga in collaboration with competent yoga centres.

Reference

OECD (2013). *OECD Guidelines for Measuring Subjective Wellbeing*. OECD Publishing, Accessed from <http://dx.doi.org/10.1787/9789264191655-en> on December 21, 2015
www.holisticonline.com/Yoga/hol_yoga_benefits.htm - accessed on 11th March 2017