

Assessment of Therapeutic Effect of Yogic Practices on the Immune Response and Body Weight of HIV Infected Subjects: A Randomized Controlled Trial

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Abstract:

Immunity is the physiological state of body in which it is able to resist the attack of particular disease causing organism or substance. Acquired Immune Deficiency Syndrome (AIDS) is the condition in the body that the whole immune system is collapsed due to the Virus namely Human Immune-deficiency Virus (HIV). The treatment of HIV/AIDS is a highly challenged job across the world. Yoga has got the potential to bring the prosperity and happiness to the practitioner. Attaining perfect health through yoga is a time tested factor. The present study is chosen in order to find out an alternative and authentic approach through yoga, to assess how yoga effects on immune response and body weight and for the betterment of the quality of life of the HIV infected people as well as to standardize the yogic practices to cure or manage HIV/AIDS.

In the study, 100 subjects are selected which involves both males and females. The subjects are divided into two groups equally i.e., 50 subjects in Experimental Group and 50 subjects in Control group. Experimental Group members were practiced various Yogic Practices. Control group subjects continued their normal routine. Both the groups were under their regular ART treatment. The duration of the study is 6 months which includes 3 months of practice and 3 months of follow-up. To find the effect of yoga, the hematological parameters such as CD4 counts, Total WBC count, Absolute count and body weight of WBCs are used.

The study has shown highly significant improvement at the level of $p < 0.001$ in the Parameters of experimental group such as Total Count of WBC, Absolute count of Neutrophils and Lymphocytes clinically as well as statistically. Decreasing tendency of cell counts (Cytopenia) is noticed in the control group subjects in the duration of 6 months. It is evident that, there are lot of side effects to the HIV subjects who are under the HAART.

Keywords: HIV, Yoga Therapy, ART, Immune response

Introduction:

Immunity is the physiological state of body in which it is able to resist the attack of particular disease causing organism or substance. The activity or action of immune system against the disease causing organism is called immune response. In the present era, the individuals are subjected to various kinds of diseases/disorders due to unhealthy living

and lack of awareness regarding the personal health. Acquired Immune Deficiency Syndrome (AIDS) is condition in the body that the whole immune system is collapsed due to the Virus namely Human Immune-deficiency Virus (HIV). The treatment of HIV/AIDS is a highly challenged job across the world. The world wide spread of HIV infection has resulted in a dramatic lowering of life expectancy

in some countries¹. There is a treatment namely ART introduced in 1996 by CDC. Currently, the modern medical science considers it as the only effective therapy for HIV which slows the progression of HIV into AIDS and it helps in the prevention of opportunistic infections. But haematological and biochemical abnormalities like Cytopenia are among the most common clinical manifestations of HIV subjects on ART².

Good health is individual's priceless treasure. If one does not possess good health, one cannot enjoy success, prosperity, peace and other comforts of life. This can be achieved by following and practicing Yogic principles by continuous effort. Yoga has got the potential to bring the prosperity and happiness to the practitioner. Attaining perfect health through yoga is a time tested factor. The present study is chosen in order to find out an effect of yoga on the immune response, whether the yoga helps to maintain the body weight and also for the betterment of the quality of life of the HIV infected people as well as to standardize the yogic practices to manage HIV/AIDS.

Aims & Objectives:

- To find out the impact of selected Yogic practices on the immune response of HIV infected people.
- To assess the body weight of HIV infected people.

Methodology:

The present study is done in a HIV network centre of Mangalore city of Dakshina Kannada district, Karnataka state, India. The subjects of age group between 25 to 50 years with HIV infection are considered for the present study. Informed written consent is taken from the subjects who are participating in the study. The research title has clearance from the institutional human ethical committee.

In this study, 108 subjects are selected which involves both males and females. The subjects are divided into two groups equally i.e., 54 subjects in Experimental Group and 54 subjects in Control group. A detailed case history of each of the subjects is taken. According to the symptoms and condition of the subject, the Experimental Group members were practiced various Yogic Practices. Control group subjects continued their normal routine. Both the groups were under their regular ART treatment. The duration of the study is 6 months which includes 3 months of practice and 3 months of follow-up. Here the subjects are treated and individual care is taken to enhance the effect of Yogic practices. Data are collected before and after the Yogic Intervention.

The following parameters are selected for the study:

1. **CD4 Count (Helper T-cell Count):** Counting the number of helper T-cells technically called CD4+ lymphocytes is the most important tool used to assess the overall health of the immune system in people with HIV. The normal CD4 count is between 500 and 1500 cells/cumm. Without anti-HIV treatment, the average HIV-infected person undergoes a decrease in helper T-cell count of about 50 to 100 cells per cubic millimetre each year. Opportunistic infections typically occur once the helper T-cell count falls below 200.
2. **Total Count:** Total count is the representation of number of WBCs. White blood cells or leukocytes are cells of the immune system involved in defending the body against both infectious diseases and foreign materials. Leukocytes are found throughout the body, including the blood and lymphatic system. The elevated counts signify an infection. The Normal Range is 4000- 11000 cells/cumm.
3. **Differential count (DC) & absolute count:** WBC Differential count determines the percentage of each type

of white blood cell in a sample. The absolute count depicts the exact number of blood cells present in a sample.

- i. **Neutrophil:** Neutrophil defend against bacterial or fungal infection and other very small inflammatory processes that are usually first responders to microbial infection. The neutrophil count may be lowered by certain medications used by people with HIV. Normal Range is 60-70%and absolute count is 1800-7700 cells/mm³.
- ii. **Lymphocyte:** Lymphocytes are much more common in the lymphatic system. Lymphocytes are the key WBCs involved in immune responses and are often lowered by HIV infection. The normal range is 20-45%and absolute count is 800-4800 cells/mm³.

4. **Body Weight:** Body weight is an essential parameter to assess the physiological condition of the body and it also signifies the level of Immunity. Especially in the HIV infected people, it is most common symptom that there is a drastic decrease in the normal body weight of the infected

individual. So body weight is considered as a parameter.

Yogic Intervention:

Yogic intervention for the current study involved the following practices and taught in the same sequence. According to the *prakrti*- nature of the individual, the practices are taught to the subjects.

Vahnisara, Kapalabhati, Swastikasana Vajrasana, Suptavajrasana, Simhasana, Trikonasana, Parsvakonasana, Veerabhadradasana, Pascimottanasana, Purvottanasana, Janusirsasana, Pavanamuktasana, Bhujangasana, Dhanurasana, Makarasana, Bharadwajasana, Ardhamatsyendrasana, Uttanapadasana Ujjayi, Anuloma-Viloma, Suryabedhana, Bhastrika, Bahya Kumbhaka, Bhramari Mahamudra, Viparitarakarani, Pranava Dhyana Yoga Nidra, Savasana

Result:

Paired t-test is used to analyse the data and to find out the effectiveness of Yogic Treatment. The findings are tabulated as below.

Table 1: Statistical summary of control group

	Size (n)	Min	Max	Median	Mean	S.D	C.V (%)	S.E
CD ₄ .pr	50	238	956	534.00	521.42	162.38	31.14	22.96
CD ₄ .po	50	1080	884	590.50	571.82	183.64	32.11	25.97
TC.pr	50	3300	9200	4600.00	5150.00	1451.99	28.19	205.34
TC.po	50	2900	9500	4300.00	4946.00	1674.44	33.85	236.80
neu.pr	50	1677	4692	2183.00	2572.88	864.43	33.60	122.25
neu.po	50	1540	4560	2265.00	2490.84	883.57	35.47	124.96
lym.pr	50	990	4140	1710.00	1856.74	569.73	30.68	80.57
lym.po	50	841	4085	1597.50	1765.02	569.72	32.28	80.57
bw.pr	50	40.0	67.5	53.00	53.08	7.06	13.30	1.00
bw.po	50	38.0	68.0	52.50	51.88	6.91	13.32	0.98

Table 2: Statistical summary of experimental group

	Size (n)	Min	Max	Median	Mean	S.D.	C.V (%)	S.E
cd4.pr	50	208.00	1036.00	560.00	580.82	192.69	33.18	27.25
cd4.po	50	351.00	1120.00	614.00	637.60	184.58	28.95	26.10
tc.pr	50	2400	8400	4550.00	4762.00	1507.92	31.67	213.25
tc.po	50	3700	10300	5800.00	6018.00	1467.84	24.39	207.58

neu.pr	50	972	5964	2422.00	2498.36	1009.92	40.42	142.82
neu.po	50	1961	5076	3248.50	3207.58	841.11	26.22	118.95
lym.pr	50	720	3575	1489.50	1669.94	628.79	37.65	88.92
lym.po	50	1102	3912	2017.00	2141.94	633.19	29.56	89.55
bw.pr	50	37.00	68.80	48.25	49.29	7.75	15.73	1.10
bw.po	50	37.50	67.20	48.00	49.79	7.40	14.86	1.05

Table 3: Summary of results of statistical tests

Character	Mean of		t.stat	P.val
	Control	Treatment		
CD ₄	50.40	56.76	-0.33	0.73
TC	-204.00	1256.00	-13.53	0.00
Neutrophil	-82.04	709.22	-9.79	0.00
Lymphocyte	-91.72	472.00	-7.65	0.00
Body Weight	-1.20	0.51	-6.20	0.00

There are highly significant improvement in the Parameters of experimental group such as Total Count of WBC, Absolute count of Neutrophils, Lymphocytes and body weight clinically as well as statistically.

Discussion:

CD₄ Counts: In the experimental group, the pre CD₄ count is noticed a minimum of 208 cellsmm³ and a maximum of 1036 cellsmm³ with a range of 828 cellsmm³. The mean CD₄ count is found to be 580.82 cellsmm³ with a standard deviation of 192.69 giving a standard error of 27.25 cellsmm³. In the post, it is observed that the counts varied between 351 to 1120 cellsmm³ giving a range of 769 cellsmm³. The mean CD₄ count is observed to be 637.6 cellsmm³ with a standard deviation of 184.58 giving a standard error of 26.1 cellsmm³. In the control group, the pre CD₄ count is noticed a minimum of 238 cellsmm³ and a maximum of 956 cellsmm³ with a range of 718 cellsmm³. The mean CD₄ count is found to be 521.42 cellsmm³ with a standard deviation of 162.38 giving a standard error of 22.97 cellsmm³. In the post, it is observed that the counts varied between 153 to 1080 cellsmm³ giving a range of 927 cellsmm³.

The mean CD₄ count is observed to be 571.82 cellsmm³ with a standard deviation of 183.63 giving a standard error of 25.97 cellsmm³.

Thus the observation clearly reveals the beneficial effect of yoga therapy in increasing the CD₄ count. Though the increase is not statistically significant in the experimental group as compared to the control group, it may lead to significance if the treatment is continued for longer period. On the other hand there was small increase in the CD₄ counts of control group subjects which is not significant. The finding supports the research done by Sharma K.K et al (2013)² who depicted the beneficial effect of yoga therapy on the immune level of HIV infected children.

Total WBC Count (TC) :

In the experimental group, the pre TC is noticed a minimum of 2400 cellsmm³ and a maximum of 8400 cellsmm³ with a range of 6000 cellsmm³. The mean TC is found to be 4762 cellsmm³ with a standard deviation of 1507.92 giving a standard error of 213.25 cellsmm³. In the post, it is observed that the counts varied between 3700 to 10300 cellsmm³ giving a range of 6600 cellsmm³. The mean TC is observed

to be 6040 cellsmm³ with a standard deviation of 1479.93 giving a standard error of 209.29 cellsmm³. In the control group, the pre TC is noticed a minimum of 3300 cellsmm³ and a maximum of 9200 cellsmm³ with a range of 5900 cellsmm³. The mean TC is found to be 5050 cellsmm³ with a standard deviation of 1339.39 giving a standard error of 189.4 cellsmm³. In the post, it is observed that the counts varied between 2900 to 9500 cellsmm³ giving a range of 6600 cellsmm³. The mean TC is observed to be 4846 cellsmm³ with a standard deviation of 1544.86 giving a standard error of 218.47 cellsmm³.

It is found that there is significant effect of yoga therapy in increasing the levels of WBC count ($p < 0.01$). This is an indication of favourable effect of Yoga therapy. The control group subjects have shown a decreasing tendency of cell counts which is a clear indication of haematological abnormality.

Neutrophil:

In the experimental group, the pre absolute neutrophil count is noticed a minimum of 972 cellsmm³ and a maximum of 5964 cellsmm³ with a range of 4992 cellsmm³. The mean neutrophil count is found to be 2498.4 cellsmm³ with a standard deviation of 1009.92 giving a standard error of 142.83 cellsmm³. In the post, it is observed that the counts varied between 1961 to 5076 cellsmm³ giving a range of 3115 cellsmm³. The mean neutrophil count is observed to be 1189.5 cellsmm³ with a standard deviation of 841.1 giving a standard error of 118.95 cellsmm³. In the control group, the pre neutrophil count is noticed a minimum of 1677 cellsmm³ and a maximum of 4692 cellsmm³ with a range of 3015 cellsmm³. The mean neutrophil count is found to be 2572.9 cellsmm³ with a standard deviation of 864.43 giving a standard error of 122.2 cellsmm³. In the post, it is observed that the counts varied between 1540 to 4560 cellsmm³ giving a

range of 3020 cellsmm³. The mean neutrophil count is observed to be 2490.8 cellsmm³ with a standard deviation of 883.56 giving a standard error of 125 cellsmm³.

Lymphocyte:

In the experimental group, the pre lymphocyte count is noticed a minimum of 720 cellsmm³ and a maximum of 3575 cellsmm³ with a range of 2575 cellsmm³. The mean lymphocyte count is found to be 1670 cellsmm³ with a standard deviation of 628.78 giving a standard error of 88.92 cellsmm³. In the post, it is observed that the counts varied between 1102 to 3912 cellsmm³ giving a range of 2810 cellsmm³. The mean lymphocyte count is observed to be 2142 cellsmm³ with a standard deviation of 633.19 giving a standard error of 89.55 cellsmm³. In the control group, the pre lymphocyte count is noticed a minimum of 990 cellsmm³ and a maximum of 4140 cellsmm³ with a range of 3150 cellsmm³. The mean lymphocyte count is found to be 1865.7 cellsmm³ with a standard deviation of 569.73 giving a standard error of 80.57 cellsmm³. In the post, it is observed that the counts varied between 841 to 4085 cellsmm³ giving a range of 3244 cellsmm³. The mean lymphocyte count is observed to be 1765 cellsmm³ with a standard deviation of 569.71 giving a standard error of 80.57 cellsmm³.

Body Weight In the experimental group, the pre body weight is noticed a minimum of 37 kg and a maximum 68.8 kg with a range of 31.8 kg. In the post, it is observed that the weight varied between 40 to 67.5 kg giving a range of 27.5 kg. In the control group, the pre weight is noticed a minimum of 40 kg and a maximum of 67.5 kg with a range of 27.5. In the post, it is observed that the weight varied between 38 to 68 kg giving a range of 30 kg. The Mean body weight in the control group before the treatment was 53.08 kg as

compared to 49.29 kg in the experimental group. After the treatment, the corresponding observations were 51.88 kg in the control group and 49.79 kg in the treatment group respectively. This shows relatively larger increase in the body weight of experimental group subjects i.e. 0.51 kg and the corresponding decrease in the control group was 1.2 kg. The observation clearly reveals the beneficial effect of yoga therapy in maintaining the body weight of the HIV subjects. This increase is statistically significant at $p < 0.01$ level. When we observe individually the treatment group subjects who are underweight slightly gained weight and those who are overweight undergoes slight reduction in their weight. The reduction in the body weight of control group subjects signifies the abnormalities of HIV infection.

The increase in the neutrophil and lymphocyte count is the clear indication of improvement in the immune response of HIV infected subjects. This will become helpful to delay the progression of opportunistic infections. The decrease in the absolute count and total count is quite common and it is referred as the HIV associated haematological abnormalities that are under ART³.

The ART treatment is helpful for the HIV subjects to resist the opportunistic infections. Here, the subjects who have practiced yogic discipline along with ART have got highly significant improvements in the haematological parameters. This is because of the effectiveness of various yogic practices in improving and balancing action of psycho-physiological systems of the individual. Regular practice of classic Asanas is helpful for the better healthy immune system⁴. The Asanas, Pranayamas, Dhyana and relaxation techniques especially Yoga Nidra is more effective in improving the immunological systems as well as body weight of HIV infected subjects.

Conclusion:

The immune system of HIV infected subjects becomes inefficient day by day due to weakened immune response and the chance of getting opportunistic infections is very high. Infection with HIV and treatment with ART have been associated with several metabolic and haematological alterations⁶. In this study, the effectiveness of yogic therapy is assessed and the efficiency of yoga in improving the health condition of HIV subjects is proved. One can go for further deep research in this field to draw out the efficacy of yoga in various levels of immunological condition of HIV infected subjects.

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