

*Full Length Research Paper*

# Randomized control trial to evaluate yoga-based peer support group for human immunodeficiency virus (HIV) positive Zambian adolescents

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It has been shown that Human immunodeficiency virus (HIV) positive adolescents are more vulnerable to behavioural problems than non-infected adolescents and stress compromises immune function. There is some evidence that yoga and peer support benefits mental health. This study aimed to evaluate the impact of a 10-week programme of peer support and yoga on the psychological well being of HIV positive Zambian adolescents. An exploratory randomized controlled trial design was used. Adolescents aged 11 to 16 (n = 34) were randomized to peer group with yoga, peer support only group/social support group or waitlist control. Outcomes were immune function (CD4 count), self-rated physical health (SF12), psychological well being (Strengths and Difficulties Questionnaire). Outcomes were measured pre intervention, post intervention and at 10 weeks follow-up. There were no differences between the yoga and peer support group and the peer support only group, and both were evaluated well by participants. The peer only group had fewer emotional symptoms after the intervention ( $p < 0.05$ ), while a combination of yoga and peer support group had a beneficial effect on CD4 count ( $p < 0.05$ ). There were no differences between the groups at 10-week follow-up. Peer support/social support interventions were associated with short term benefits for the psychological and physical well-being in HIV positive adolescents, suggesting the need for sustained support.

**Key words:** Human immunodeficiency virus (HIV), acquired immune deficiency syndrome (AIDS), adolescents, yoga, peer support.

## INTRODUCTION

Human immunodeficiency virus (HIV) and Acquired immune deficiency syndrome (AIDS) is a significant threat to health and well-being in sub-Saharan Africa and in Zambia the prevalence rate reached 21% in 2002 (Slonim-Nevo and Mukuka, 2005). Around 85,000 children aged 0 to 14 years are living with HIV in Zambia and although improvements in anti-retroviral medication and increased availability of treatment has reduced the rate of perinatal transmission (Battles and Wiener, 2002), the number of children surviving into adolescence is increasing.

Psychological consequences of HIV is also well documented in various research studies, it is estimated that about 60% of HIV-1 infected individuals will suffer from at least one depressive episode during the course of their illness (Lyketos, 1993). The psychological impact of HIV infection may be particularly harsh during the teenage years since depression, anxiety, history of trauma, and behaviour problems also occur at a higher than average rate during this period (Brown et al., 2001). HIV positive adolescents are not only undergoing the inevitable biologic, cognitive and social developmental challenges of adolescents, but are also enduring the challenges of managing a chronic illness. Studies in developed countries have suggested that adolescents with HIV infection often experience difficulties with peers

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and self image (Chapman, 1998). Furthermore, there is also considerable stigma associated with HIV infection in African countries, and social rejection may contribute to the increased prevalence of depressive symptoms associated with the condition (Maj, 1996). For example, first generation immigrants of African origin who were HIV positive were observed to have very limited social networks (Asander et al., 2004), and a Zambian study of 127 HIV positive adolescents found high rates of emotional difficulties and problems with peer relationships (Menon et al., 2005).

Psychological interventions seem to be effective for the psychological problems faced by HIV positive adolescents. An effective intervention identified by many studies (for example, Funck-Bertano et al., 2005) is a peer-support group that involves seeking and receiving help from other people is a major form of coping. The availability of someone to provide help or emotional support may protect them from the negative consequences of illness and stress (Sherbourne, 1988). Having social support is a crucial aspect of adolescents, but this seems crucial for those who have chronic illness (Berkman, 2000). This study also reports that social support has an effect on an individual's immune system, mortality risk and survivability when faced with serious illness. Social support can enhance emotional well-being and buffer HIV-related psychological distress and physical symptoms (Donenberg and Pao, 2005). Funck-Bertano et al. (2005) suggests that peer support group had beneficial effect on the adolescent's acceptance and perception of their HIV infection.

As knowledge of HIV and the human immune system continues to grow, the prevention and treatment of HIV becomes increasingly complex. As a result, a multi-disciplinary approach requires the medical community to look at alternative approaches to treatment, including western and eastern medicine, nutrition and exercise. Exercise helps many people with HIV disease feel better and strengthen the immune system. Physical exercise and psychotherapy to reduce stress can enhance immune functioning in people with AIDS (Antoni et al., 1990). Research has verified the beneficial effects of exercise on psychological health and well-being across populations. For instance, regular physical activity is associated with reduced symptoms of anxiety and depression (Kaplan and Cohen, 1991). In addition to the well-documented physical health benefits of regular exercise, physical activity has been shown to be associated with a variety of psychological variables, including mood, stress reactivity, and cognitive functioning. Regular physical activity is associated with reduced symptoms of anxiety and depression (Kaplan and Cohen, 1991).

Social factors may provide exercise motivation. Research within the leisure and recreation industry has indicated that the social support system available within a recreation environment or at a recreation agency is one

of the factors which increase customer loyalty (Iwasaki and Havitz, 2004). Individuals who utilize a particular fitness facility stay more loyal to that facility if they have established a social network of friends and peers within that setting. Further research has found that social factors may be particularly important to exercise adherence within the African American community (Izquierdo-Porrera et al., 2002). This may be important when considering a social support intervention for HIV positive adolescents; an intervention that includes exercise may have an additional benefit on their physical and psychological well-being.

Yoga may be a useful exercise based intervention to enhance the physical and psychological well-being of HIV positive adolescents. Yoga is usually performed in group, is gentle and does not require much exertion. In a recent survey of complementary and alternative medicine providers, yoga was identified as an appropriate treatment for stress, anxiety and for pain (Long et al., 2001). Yogasana (physical postures in yoga) practice provides a gentle, natural means of supporting the immune system on a day-to-day basis (Pirisi, 2000). It has been argued that yoga helps lower stress hormones that compromise the immune system, while also conditioning the lungs and respiratory tract, stimulating the lymphatic system to oust toxins from the body, and bringing oxygenated blood to the various organs to ensure their optimal function.

The practice of specific asana can help balance the immune system and help support the thymus and blood to the sinus (Pirisi, 2000). While asana can help the immune system, yoga breathing techniques can condition the lungs and maximize one's breathing capacity that would build resistance to preying organisms (Kraftsow, 1999).

### Study justification

Literature is suggestive that stress and depression may be outcomes of HIV infections. As improved clinical care enables HIV-infected persons to live longer, mental health interventions that are sensitive to the complex dynamics of HIV and AIDS are also urgently needed. Peer support has been identified as an effective coping strategy, therefore support strategies aimed at broadening the patient's network and breaking their isolation need to be continued and strengthened. Although peer programmes are frequently advocated for HIV positive adolescents, a large majority of these studies have investigated their effectiveness in terms of peer education and AIDS prevention. A yoga intervention is usually carried out in small groups that could also serve as a peer group. Furthermore, yoga, when compared to other exercises such as aerobics, is gentle and relaxing, and can be easily performed without much physical strain. Peer support also acts as buffer against stressful life

events by enhancing coping effectiveness, self-esteem, motivation or involvement in health promoting behavior (Murphy et al., 2000).

## Study objectives

This study aimed to evaluate the impact of a 10-week programme of peer support and yoga on psychological and physical health of HIV positive Zambian adolescents.

## METHODOLOGY

### Design

An exploratory randomized controlled trial of a peer support and yoga-based intervention, comparing it to a peer support/social support only intervention and a waitlist group was used.

### Participants

The participants were recruited from the University of Zambia clinic. The inclusion criteria for the study were that participants should have HIV positive sero status, be aware of their HIV status, aged between 11 and 16 years and receiving anti-retroviral treatment for at least one year. Participants were required to have been on anti-retroviral treatment so as to measure the impact of the intervention on immune function.

### Measures

#### *Immune function*

The CD4 count tells how strong the immune system is, how far HIV disease has advanced (the stage of the disease), and helps predict the risk of complications and debilitating infections. The CD4 count is most useful when it is compared with the count obtained from an earlier test. Normal CD4 counts in adults range from 500 to 1,500 cells per cubic millimeter of blood. In general, the CD4 count goes down as HIV disease progresses. Blood sample is drawn from a vein in the arm and tested.

#### **Psychological well-being [strengths and difficulty questionnaire-youth (SDQ-Y) version (Goodman, 1997)]**

This is designed to be completed by children aged 11 to 15. The SDQ-Y has been shown to discriminate between a community sample of adolescents and those attending a mental health clinic (Goodman et al., 1998). Scores for the youth SDQ were shown to produce similar results to that of the parent SDQ. In a study on Dutch youths, internal consistency, test-retest stability and parent-youth agreement of the SDQ scales have been shown to be acceptable (Muris et al., 2003). SDQ-Y (English and translated versions) has been previously used with Zambian adolescents in school sample (Menon et al., 2006) and HIV positive sample (Menon et al., 2005) and was found to be a useful measure of emotional and behavioural well-being in Zambian adolescents. The SDQ produces scores for each of five subscales: conduct problems; hyperactivity; emotional symptoms; peer problems; and prosocial behaviour. Each of these consists of five items. Each difficulty item is scored on a 0 to 2 scale (not true, somewhat true and certainly

true), while the items indicating strengths (except the prosocial items) are reversely scored. A 'total difficulties' score is calculated by totaling the four deficit focused subscales (that is all, except for prosocial behaviour).

#### **Social support [medical outcomes study (MOS) social support survey (Sherbourne and Stewart, 1991)]**

This brief, self-administered social support survey instrument was developed for patients in the Medical Outcomes Study (MOS), a two-year study of patients with chronic conditions. It is easy to administer to chronically ill patients, and the items are short, simple, and easy to understand. Twenty items rated 1 to 5, with higher scores indicating greater social support. The measure generates a total score reflecting overall support and 4 subscales (tangible support, affectional support, positive social interactional support and emotional/informational support). High internal-consistency reliability is reported for all scales, exceeding 0.5 standards. When compared to other measures, it correlated most highly with measures of loneliness or emotional ties, followed by measures of family and marital functioning and mental health. Lowest correlations were with the measures of physical health such as physical functioning and pain intensity. In this study, 'peer support' is being used interchangeably with 'social support'.

#### **Self-rated physical health (SF-12)**

The 12-item Short-Form health survey (SF-12) was developed in the United States as a shorter alternative to SF-36 to describe mental and physical status and to measure outcomes of health care services. SF-12 has a subset of 12 items from SF-36 from the physical summary measure, one item from the bodily pain (BP), general health (GH) and two items from physical functioning (PF) and role-physical (RP), and six items from the mental summary measure, that is, one item each from vitality (VT) and social functioning scales (SF) and two items each from role-emotional (RE) and mental health (MH) scales. All the 12 items are used to calculate the Physical component summary and Mental component summary. SF-12 has been previously used in research studies (Clarke et al., 2005; Boothroyd et al., 2005) as a measure of physical and mental health with adolescents.

### Procedure

#### **Baseline (pre intervention)**

Children meeting the inclusion criteria were informed about the study and asked if they would be willing to participate in the peer support yoga group. Signed consent was obtained from children and parents/guardians. Children were grouped into threes by age. At baseline, children completed the SDQ, SF-12 and the Social support survey. CD4 T-cell count was also taken. One child in each group was randomised to the yoga and peer support group or peer support/social support only group or the wait list group.

#### **Intervention**

The group intervention was carried out over a 10-week period with 2 sessions per week. Each session lasted an hour and was divided into two parts. The first half of the session was identical for yoga and peer support group, as well as for peer support only group. This involved participative group discussions and activities on health related topics, especially on HIV and AIDS. During this

session, the participants were encouraged to share their experiences and learn from each others experience. The latter part for the yoga and peer support group involved relaxing group exercises and activities such as story reading, coloring, non-competitive games (craft activities) for the peer support only group. The researcher is a certified yoga instructor.

### **Gentle relaxing group exercises based on yoga**

This includes:

1. Breathing practices aimed at bringing into utilisation all the lobes of the lungs to make breathing continuous and rhythmic;
2. Physical postures or asana to develop and strengthen the muscles and stamina of the organs and systems of the body, promoting positive health and overall well being. The actual asana used in the intervention was decided depending on the ease and comfort of the participants in performing them. Two asana from standing, sitting, prone and supine positions were used;
3. Deep relaxation aimed at relaxation and anxiety reduction. The participants were subjected to deep relaxation after the physical postures;
4. Pranayama or breath control aimed to achieve controlled breathing and reduce physical symptoms of anxiety. The session ended with a pranayama.

### **Ten-week follow-up**

At the ten-week follow-up, all participants completed the SDQ, SF 12 and Social support questionnaire. CD4-T cell count was also obtained. Participants in the intervention group were interviewed concerning their views about the intervention.

### **Data analysis and management**

Quantitative data were analysed using Statistical Package for the Social Sciences (SPSS) for windows version.15.0. Descriptive statistics were used to describe the demographic characteristics of the sample. Non-parametric analysis of variance (Kruskal Wallis) was used for non-normally distributed (from SF 12), ordinal data and repeated measures analysis of variance was used to analyse data from SDQ. The data from each participant was coded to ensure confidentiality, and identifying details were stored separately from the data. Data were analysed on an intention to treat basis by substituting baseline data for missing values.

## **RESULTS**

There were 76 children in the age group of 11 to 16 registered in the pediatric Anti-retroviral clinic at the University of Zambia clinic. Of these, 34 had parents or guardians consent to their participation in the study and attended the baseline session and therefore included in the study. Twelve children were randomised to peer-support plus yoga intervention, 11 to peer-support only and 11 to waitlist control. All the children in the two intervention groups remained in the study post-intervention and at 10 weeks follow-up. In the wait list control, one child died between baseline and post-intervention and 4 were lost to follow-up. Characteristics

of the sample are shown in Table 1.

### **SDQ scores**

SDQ scores were obtained from the three groups at the three time points and compared. There were no significant differences in SDQ scores at baseline. Immediately after the 10 week intervention, the social support and craft activity group had lower scores on emotional symptom scale ( $Z = -2.57$ ,  $p = 0.01$ ) when compared to the waitlist group (Figure 1). There were no differences between the groups at follow-up.

### **Scores obtained on MOS social support**

There were no significant differences in the scores obtained by the participants on the four sub scales and for total social support.

### **SF-12 scores**

There was a significant difference in the scores on role emotional subscale at Time 2. The yoga support group had significantly lower scores than social support group ( $z = -2.5$ ,  $p = 0.014$ ) and waitlist group ( $z = -1.9$ ,  $p = 0.046$ ) for role emotional support. SF-12 scores for general health scale and role emotional scale at different time points are shown in Table 2.

### **CD4 T-cell count at the three time points**

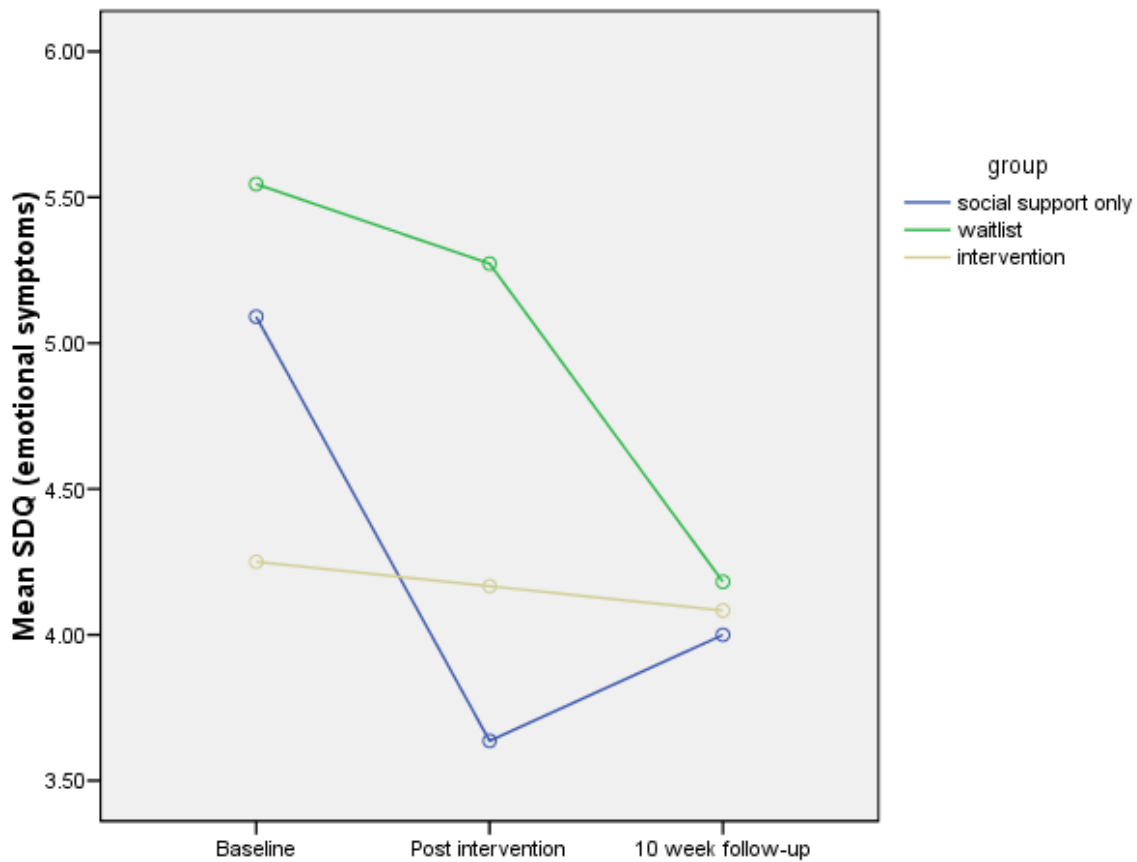
A repeated measures Analysis of variance (ANOVA) was conducted with CD4 count as the dependent variable group as the between subjects factor, and time of testing as the within subjects factor. There was a main effect of time with CD4 count significantly increasing between Time 1 and Time 2 ( $t = -2.9$ ,  $df = 33$ ,  $p = 0.006$ ) and decreasing significantly between Time 2 and Time 3 ( $t = 5.1$ ,  $p = 0.001$ ). There was no effect of group and no linear interaction between group and time. Change scores were calculated by subtracting Time 2 from Time 1 and Time 3 from Time 1 (Table 3). There were no differences in change scores between the peer support group and waitlist or between the yoga peer support group and peer support only group. However, the yoga group had significantly more improved scores at Time 2 compared to waitlist ( $t = 2.351$ ,  $p = 0.019$ ). Differences in CD 4 T-cell count at the different time points are shown in Figure 2.

## **DISCUSSION**

Although significant advances have been made in the

**Table 1.** Characteristics of the sample.

Parameter	Yoga peer support group (Group2) (n = 12)	Peer support only (Group 0) (n = 11)	Wait list group (Group 1) (n = 11)
Mean age (SD)	12.7 (2.1)	13.4 (1.6)	12.8 (2.0)
Gender			
Male	10	6	6
Female	2	5	5
Residence			
Both parents	0	1	1
One parent	5	5	5
Other relatives	7	5	5
Average period on ARVs (months)	22.5	16.5	22
Route of transmission			
MCT	11	11	11
Risky behaviour	1		



**Figure 1.** Emotional problem sub-scale score by group.

treatment of serious disease such as HIV and AIDS, there remains much scope for assisting young people in

adjusting to life with a chronic medical condition. Commonly, chronically ill young people experience lower

**Table 2.** SF-12 scores at the different time points.

Parameter	Yoga and peer support group (Group2)	Peer support only group (Group 0)	Wait list group (Group 1)	P value
General health				
Time 1				
Mean (SD)	59.8 (38.8)	45.2 (30.1)	53.4 (25.7)	$X^2 = 1.20$
Median (IR)	61 (25-100)	25 (25-61)	25 (25-61)	$p = 0.55$
Time 2				
Mean (SD)	80.6 (22.2)	74.6 (23.2)	53.8 (30.8)	$X^2 = 4.80$
Median (IR)	84 (66.7-100)	84 (66.7-100)	61 (25-84)	$p = 0.09$
Time 3				
Mean (SD)	82.8 (11-9)	80.6 (14.1)	66.4 (24.3)	$X^2 = 3.79$
Median (IR)	84 (84-84)	84 (61-84)	61 (61-84)	$p = 0.15$
Role emotional support				
Time 1				
Mean (SD)	51 (18)	45.5 (21.8)	55.7 (22.6)	$X^2 = 0.96$
Median (IR)	50(40.6-59.3)	50 (25-50)	50(50-62.5)	$p = 0.62$
Time 2				
Mean (SD)	40.7 (25.2)	65.9 (18.6)	61.4 (18.1)	$X^2 = 7.49^*$
Median (IR)	43.8(28.1-59.4)	62.5(50-75)	50 (50-75)	$p = 0.02$
Time 3				
Mean (SD)	61.5 (28.4)	63.6 (27.6)	68.2 (17.1)	$X^2 = 0.66$
Median (IR)	50(40.6-96.9)	62.5(50-100)	75 (50-75)	$p = 0.72$

\* $p < 0.05$ **Table 3.** Difference in CD4 T-cell counts at difference time points.

Yoga peer support group	Mean at Time 1	Mean at Time 2	Mean at Time 3	t-value
CD4a-CD4b	525.0	632.6		-2.8*
CD4a-CD4c	525.0		444.8	1.6
CD4b-CD4c		632.6	444.8	5.9*
<b>Peer support only group</b>				
CD4a-CD4b	437.9	419.1		-1.8
CD4a-CD4c	437.9		419.1	0.2
<b>Wait-list group</b>				
CD4a-CD4b	486.9	516.9		-0.8
CD4a-CD4c	486.9		474.5	-0.2
CD4b-CD4c		516.9	474.5	1.0

\* $p < 0.05$ .

emotional well being than their healthy peers (Olsson et al., 2000). This study provides some evidence for the positive effect of support group with HIV positive

adolescents. This is in line with previous research studies that suggest that peer support might act to improve resilience and well being (Olsson and Toumbourou,

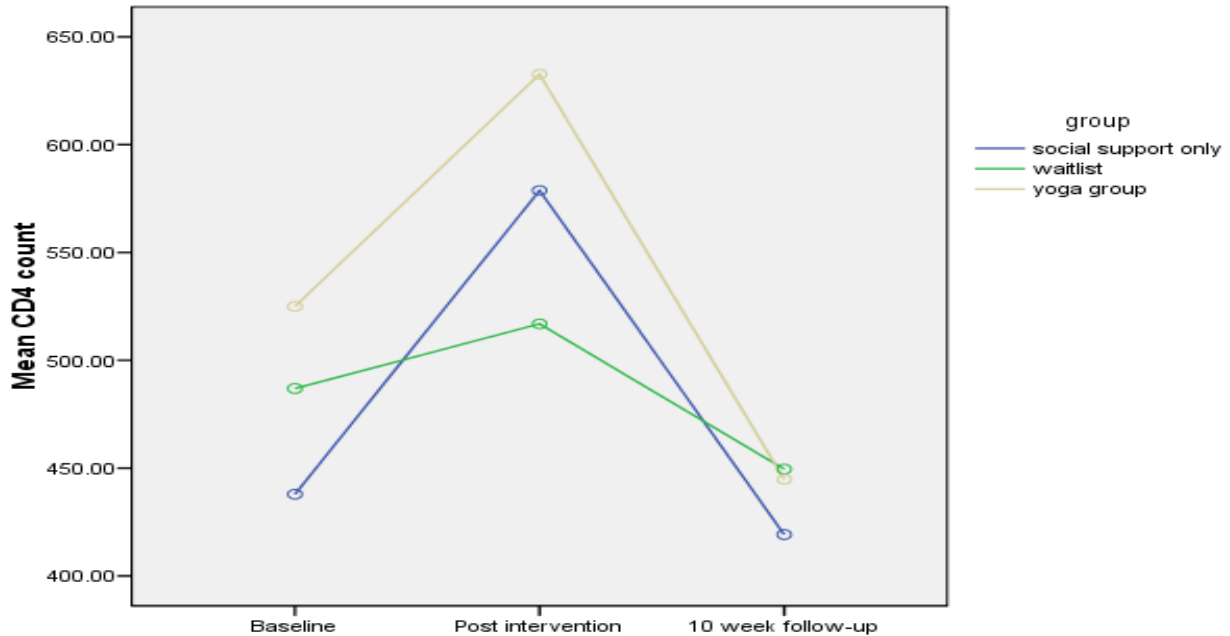


Figure 2. Change in CD4 count at different time points

1996; Weiner et al., 2006).

Research suggests that HIV positive individuals have high rates of psychological disturbance (Funck-Brentano et al., 2005). This is of particular concern since stress and psychological status may affect disease progression in HIV infected individuals (Kopnisky et al., 2004) and psychosocial factors have been shown to have clinically significant relationships with immune related outcomes for HIV (Kiecolt-Glaser et al., 2002). Social support seems to have a positive effect in enhancing the emotional well being of participants in this study. The participants in the peer support only group had less emotional problem (as measured by SDQ), immediately after the ten week intervention, when compared to the other two groups.

Studies indicate that yoga has been beneficial in reducing anxiety and depression in older adults who attended a geriatric clinic and presented with a wide range of effective symptoms related to anxiety and depression (Allen and Steinkohl, 1987). But the score on role emotional scale of SF-12 indicates that the yoga and social support group had less emotional problems when compared to the peer support only group and the waitlist group. Sherman et al. (2000) provided evidence that sharing one's diagnosis with friends can provide observable health benefits and may also improve psychological health, indicating the importance of disclosure.

In this study, the participants of yoga and social support group show significantly higher CD4 at immediately after the intervention, as compared to the other two groups. Therefore, it could be argued that it may be the practice of yoga based exercise which may have led to the higher

CD4 count in this group. This is in line with the findings of other research studies (Kraftsow et al., 1999) which suggest that practice of yoga may reduce the level of stress hormones that compromise the immune functioning. This finding also confirms the findings of a recent study evaluating a peer support group as therapy for adolescents with HIV that demonstrated a decrease in viral load in participants attending peer support group (Funck-Brentano et al., 2005). Higher CD4 at baseline was related to better social support, thereby again supporting the findings of Funck-Brentano et al. (2005).

Some studies demonstrated that exercise is able to increase CD4 T-cells of HIV infected individuals (Cooper, 1994). Lethargy and fatigue which are typical with advancing of HIV infection may be a compensatory mechanism to conserve body mass in light of increased resting expenditure of energy, and exercise may have the potential to at least temporarily reverse this. Other studies have also supported the benefit of yoga on the psychological wellbeing of HIV positive individuals. Caroleo (1994) identified several therapeutic recreation programs that reduce stress and anxiety in HIV positive individuals including "yoga, massage, acupuncture, acupressure, chiropractic services, meditation, reiki, physical and breathing exercises and visualization". In our study, the participants in the yoga support group had higher self-rated physical health after the intervention when compared to the control group. Yoga can also be viewed as a group support, as it is done in groups, and may therefore lead to the same benefits of social support group, with an added advantage of exercise, especially yoga-based.

## Strengths and weaknesses of the Study

The strengths of this study are the randomization of participants into the intervention and waitlist groups. The participants were also matched for age and gender to minimize variation between groups. The study also used standardized outcome measures. There were a small percentage of drop outs in the wait list group. The small sample size of the study may also limit the generalization of its findings.

## CONCLUSION

Conventional approaches to promoting emotional well being have involved referring young people and their families to an appropriate public mental health service or psychologist/psychiatrist in private practice. However, there is increasing interest in the use of peer support programs (Olsson et al., 2000). Our study found evidence for the benefit of peer support and yoga based exercises for HIV positive adolescents.

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