Flowcytometric Study of T-cell Subset And Natural Killer Cells in Peripheral Blood of Art of Living Teachers, Normal Subjects and Cancer Patients

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Abstract

T-lymphocyte subsets (T-helper and T-suppressor cells) and Natural Killer (NK) cells has been recognized as an important cellular component of the immune system. T-helper cells mediates immune response by providing help to B-lymphocytes in antibody production as well as these cells on activation produces soluble factors that amplifies immune response of the host. On the other hand T- suppressor/ cytotoxic cells are capable of killing tumor and infected cells. NK cells are surveillance cells of the immune system that can directly destroy tumor cells and infected cells very efficiently without any prior sensitization. Considering their importance in immune response, present study was done to enumerate these cells in peripheral blood of 'Art of Living (AOL)' teachers, normal controls and cancer patients by flowcytometry in order to find out if there is any change in these groups.

In the present study total T-cells and its T-helper subset were significantly higher in AOL teachers and normal controls as compared to cancer patients. However, no significant difference occurs in these cells between AOL teachers and normal subjects. A significant difference was found in NK cells that was significantly higher ($p<.0001$) in AOL teachers as compared to normal and cancer patients. No significant difference was seen in NK cell population between normal subjects and cancer patients. Since other factors are same in normal subjects and AOL teachers the higher NK cells in AOL teachers could be attributed to the practice of AOL (Sudarshan Kriya).

Introduction

The deciphering of a common language for brain and immune system seems to herald a dramatically new view of this two-recognition network and the way they interact. Physical and psychological stimuli may set a pattern of neurotransmitter, hormones and cytokines which may act on receptors of immune cells causing alteration of its effector population and function through induction of chemical mediators like cytokines (Blalock 1994). In turn cytokines can act on the brain cells and endocrine cells through their receptor to modulate their functions.

It has been shown beyond doubt that stress is associated with a distinct set of physiological changes, most notably on the immune-neuro-endocrine axis (Brines,1994). These are non-adaptive and potentially can lead to disease. Certainly, relaxation techniques like Sudarshan Kriya and Pranayam may have profound effect on the reversal of the stress thereby it may potentiate the immune functions of the host. Despite therapeutic adaptation of the relaxation response for a variety of somatic disorders, its impact on the immune system remains unknown.

It has been well documented that cancer in most cases, is associated with immuno-suppression and a better immune response is associated with better prognosis Most of the cancer patients have shown to have more stress and anxiety not only because of its diagnosis but due to treatment as well. Most of the anti cancer drugs are antiproliferative and lead to immunosuppression that may persist during the period of remission. Such down regulation of immune response could be related to higher degree of recurrence in such cases.

Therefore, present study has been planned to observe immune status of AOL teachers, cancer patients and normal subjects by quantitative estimation of major lymhocyte subsets in the peripheral blood using two colour flowcytometry technique.

Materials And Methods

This study was done on 17 AOL teachers, 17 cancer patients and 63 normal subjects of either sexe. Age of the subjects ranged from 18 to 65 years. Blood samples were drawn at 10 am from all the subjects to avoid diurnal variation. Fluorescence staining for major lymphocyte subsets (total T, T-helper, T-suppressor/cytotoxic and NK) cells was done by using FITC / PE labelled monoclonal antibody (CD3, CD4, CD8 and CD16/56) respectively by whole blood lysis method as per manufacturer's instructions. About 10,000 events were acquired in flowcytometer (Becton –Dickinson, USA). The data was analyzed using CELL QUEST computer software as shown in fig.1.

Results And Discussion

The results have been shown in Fig. 2. In the present study total T-cells and its T-helper subset were significantly higher in AOL teachers and normal controls as compared to cancer patients. However, no significant difference occurs in these cells between AOL teachers and normal subjects. A significant difference was found in NK cells that was significantly higher ($p<0.001$) in AOL teachers as compared to normal and cancer patients. No significant difference was seen in NK cell population between normal subjects and cancer patients. Since other factors being the same both in normal subjects and AOL teachers the higher NK cells in AOL teachers could be attributed to the practice of AOL (Sudarshan Kriya). It seems therefore, that regular practice of SKP leads to enhanced NK cell population.

The physiology of relaxation response is complex. Its features

are opposed to the findings of acute and chronic stress and include decreased heart rate, blood pressure, and peripheral muscle tonus and oxygen consumption. Recent neurological data indicate a global decrease in cerebral blood flow to the amygdala, prefrontal and orbital gyri and septal nuclei (Lazar et al 2000).

There are some studies suggesting profound effect of relaxation exercise on brain, behaviour and neuroendocrine immune axis. Salivary immunoglobulins have been reported to be increased in response to a single session of relaxation response elicited by attention to breathing in group session (Green et al 1987, 88). In other studies relaxation techniques have shown to enhance cellular immunity, particularly delayed hypersensitivity (DTH), response (Black 1963) and mitogen responses to isolated lymphocytes (Mc Grady et.al.1992). Both mitogenic response and DTH response are the effective parameters of T-helper cell activity. NK- Cells are the effector cells of the innate immunity. Recently NK Cells gained higher importance as these were shown to be activated in response to lymphokines (IL-2, IFN-g) and are transformed into lymphokine activated killer (LAK) cells that show augmented cytotoxic response against tumour cells. Progressive relaxation intervention has shown augmented NK- cell activities (Zachariae et al 1990, Mc Grady 1992). In another study Ironson (1995) noted significantly higher expression of IL-2 receptor and antibody titre to Epstein-Barr Virus (EBV) in subjects undergoing relaxation techniques. A recent study on 111 subjects of both sexes have shown that group drumming music therapy has a potential for alteration of stress related hormones and enhancement of specific immunological measures associated with NK-cell activity and cell mdiated Immunity (Bittman et al 2001). Group drumming resulted in increased dehydroepiandrosterone to cortisol ratio, increased NK- cell activity and increased lymphokine activated killer (LAK) cell activity.

Therefore, it seems that the relaxation techniques have profound effect on protective immunity of the host. However, a detailed systematic and multi-parametric study of immune functions in subjects undergoing Sudarshan Kriya and Pranayam would be most essential and useful to establish it as an alternate therapy for subjects suffering from stress and stress related disorders.

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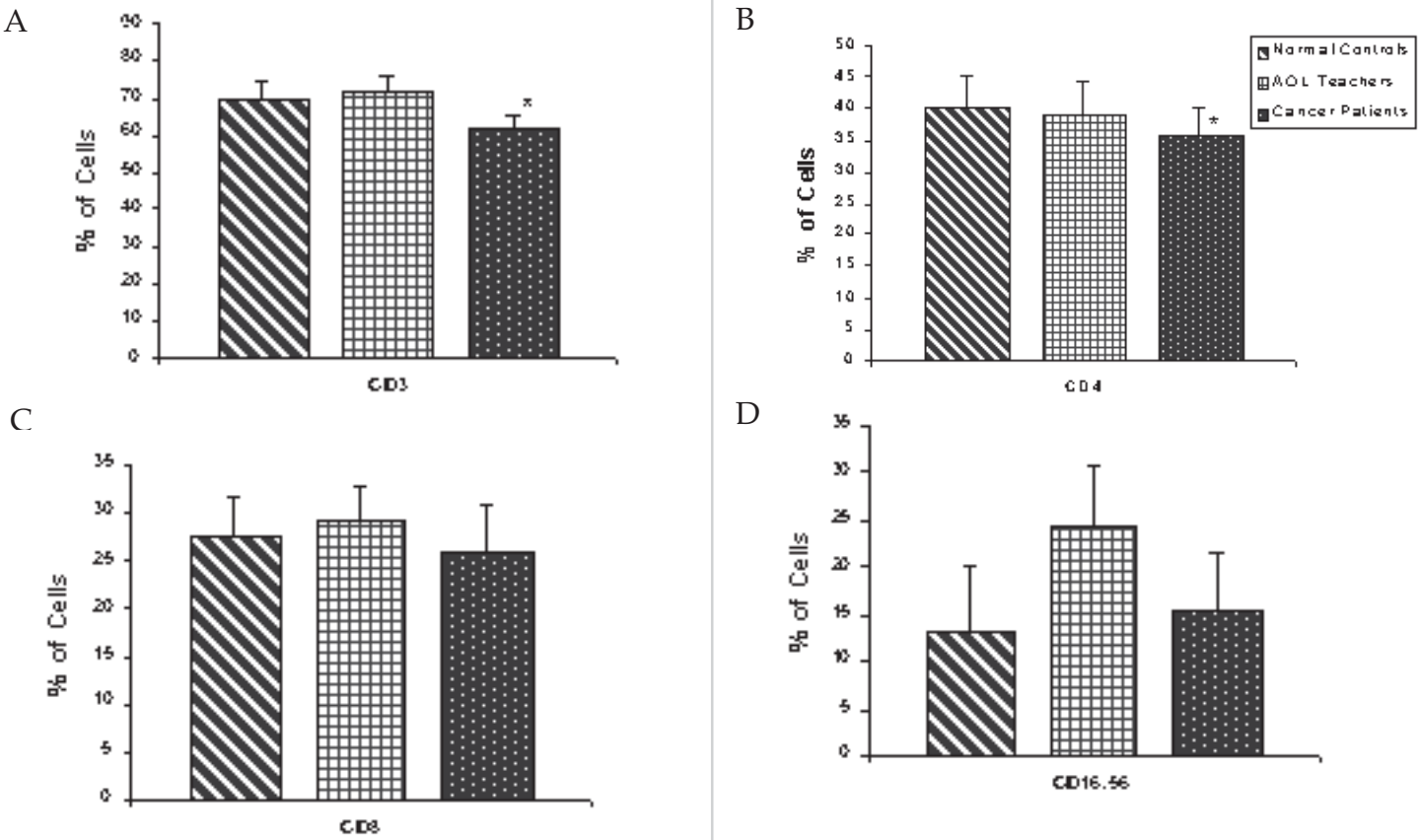

Fig.2 : T-cell sub sets and Natural Killer Cells in different groups (*p<0.001). All the research at AIIMS has been :
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