COMPARATIVE STUDY OF DEHA BALA IN PROFESSIONAL AND PHYSICAL EDUCATION COLLEGE STUDENTS- A OBSERVATIONAL CROSS SECTIONAL STUDY

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ABSTRACT

Prakriti is nothing but the expression of one's ows constitution which is specific for every individual. *Prakriti* is responsible for the physical characteristics like strength, appearance and physiology of body. The personality in modern science is defined as expression of a person in context to morphology, physiology, behavior and relation to ecology. *Acharya*s have described the relation between *Dehaprakriti* and *Dehabala.* According to *Ayurveda* the person with balanced *tridosha* is considered *shreshta* (best) while the *Kapha prakriti* person has *Uttam bala* (good strength), the *pitta prakriti* person has *madhyam bala* (moderate strength) and *Vata prakriti* person has *alpa bala* (poor strength). It indicates that *dehabala* varies according to *dehaprakriti*. *Bala* is nothing but the foundation of *sharira*. Without foundation building can't be stable similarly without *bala* any person can't be stable or live a long life. When *Dehabala* is in normal amount the capacity of person to perform strenuous work will be good and also the vitiation of the *doshas* will be kept under control. The *Dehabala* in modern science is considered as strength, vigor or energy. According to *Ayurveda dehabala* should be measured by *vyayamashakti*. This shows the relation between *dehabala* and *vyayama*. Harvard step test is a physical fitness test use to assess individuals working capacity or strength. This test is practically applicable by *Ayurveda* as *bala* should be measured by *Vyayam Shakti.*

KEYWORDS: - Deha Prakriti, Bala, strength, Vyayamashakti etc.

INTRODUCTION

Ayurveda is time tested knowledge as we all know. It possesses the huge potential in its journey from its origin to the present day which left us wondered. Its successful existence since ancient time proves the scientific approach attributed to their unique basic principles that remain unchanged till date.

प्रयोजनं च अस्य स्वस्थस्य स्वास्थ्य रक्षणम् ।

आतुरस्य विकार प्रशमनं च ॥[1]   च.सु. ३०/२६

The aim of *Ayurveda* is to prevent the disease in healthy person and to provide cure in the diseased ones.In regard of this various *acharya* in their commentary stated the ways of healthy life and gives advices to prevent from the disease in the form of *Dincharya*, *Ritucharya* etc. Knowledge of *Ayurveda* make us enable to understand how to create the balance of body, mind and consciousness according to one's own constitution and how to make lifestyle changes to bring about and maintain this balance.

In *Ayurveda* among many concepts *prakriti* is one basic concept. The *tridosha* are the originator of *Prakriti*. At the time of fusion of ovum and sperm the dominated *dosha* is responsible for the formation of *Prakriti*.[2] *Prakriti* decides the physical appearance of the person, strength, ability to adjust with changing enviorment etc.Though *Prakriti* remains unchanged in entire life one can achive health and happiness by knowing his *prakriti* forming *dosha* and doing the necessary adaptation to improve his health.

In modern science one can correlate *prakriti* with genoms. Because it is the genom which are responsible for the development of personality. The study of personality is based on the essential insight that all people are similar in same way yet different from others.[3] This role in *Ayurveda* is elaborated thoroughly with its origination by *Prakriti.*

The *bala* is another important concept of *Ayurveda* and it has a relation with *prakriti*, *kala*, age, diet, *desha* etc. Since past the concept of *bala* is important in the journey of life.For all the living beings particularly the human beings there is need of the *bala* to peform various functions. The *bala* is important not only in case of ruling or dominating over other but also protect ourself from adverse conditions.

Deha bala is nothing but the strength of an individual i.e ability to do work. In *Ayurveda* such *Dehabala* varies from person to person. According to *Ayurveda* the *bala* which is related to *sharira* is called as *Dehabala*.[4]

देहस्य बलं देहबलम् ।   च.सु.-६/७ चक्रपानि

Bala is classified into three types *sahaja bala, kalaja bala, yuktikruta bala*.[5] *Sahaj bala* is innate and it is created with *prakriti* and remains same for the whole life. *Kalaja bala* in any human is differs according to season and age.It is not under control of any living being.Where as *yuktikrut bala* is variable, it can be increased or decreased. After performing various types of exercises *dehabala* can be improved. It can be gained by adopting life style according to *Prakriti*.

Now a days interest in physical as well as in mental and spiritual fitness is increasing especially for physical fitness because it has a relationship with good health. For this *Ayurveda* includes detailed description of *vyayama* in regard of their indications, contraindications, also the diseases occuring due to excessive exercise and limitation of time for *vyayama* are the other important topics. Besides that *vyayama* is indicated as a treatment in many diseases.

Assessment of *dehabala* by *Ayurveda* is done on the basis of *vyayam Shakti*.[5] Due to this *acharya* includes *vyayama* in *Dashavidha pariksha*. Harvard step test is a physical fitness test use to assess individuals working capacity or strength. This test is practically applicable by *Ayurveda* as *dehabala* should be measured by *Vyayama Shakti.* It means there is relation between *Dehabala* and Vyayama.This concept needs to be elaborate and explained for which this study is being planned.

Professional college students during the course of their education is subjected to different kinds of anxiety and stress predominantly the pressure of academics leading to the successful completion of the education course. There has been decrease in physical activity due to more sedentary lifestyle. This leads to many lifestyle disorders.There is need to know the physical strength of our furture doctors. They can be sentizised to purse a healthy life style right from the beginning of their career. Therefore the study has under taken to acess *Dehabala* of professional and physical education college students using Harvard step test.

Rationale of study

Physical education students have opportunity to set achievable goals due to their awareness about physical fitness. Sports and various types of exercise is the part of their education. On the other side in professional colleges' students schedule is very busy and stressful than other college students. They don't do any type of exercises, sports or any other physical activities to become fit and to overcome the stressful conditions. They are not conscious about their health. To achieve good score in academic and to do best in their profession they must be able bodied. In this condition to find out what will be the difference in the *dehabala* of Professional and Physical education college students, the present study is selected.

AIMS AND OBJECTIVES

Aim: To study the difference between *Dehabala* of professional and physical education college students.

Objectives

Primary Objective: To find out difference between *Dehabala* of Professional college students and physical education college students.

Other Objectives

1) To study *Dehaprakriti* of professional and physical education college students.
2) To study *Dehabala* of professional and physical education college students.

Hypothesis

Null hypothesis - There is no difference between *Dehabala* of Professional and physical education college students.

Alternate hypothesis - There is difference between *Dehabala* of Professional and physical education college students.

Review of literature

Ayurvedic **review of** *prakriti*

Nirukti **of** *prakriti*

a. प्रकृतिः शरीरस्वरुपम्।[6]   अ.हृ.सु.१/१० (अरुणदत्त).

Prakriti means individuals nature i.e enumeration of body features internal as well as external. *Prakriti* is nothing but an expression of ones' own constitution. And it is specific for each an every individual according to the dominant *doshas*.

Defination of *prakriti*

Doshika predominance at the time of fusion of sperm and ovum, that remains unchanged from birth to death is called as *Prakriti*[7].

Prakriti* as *deha prakriti

दोषानुशयिता ह्येषां देहप्रकृतिरुच्यते।[8]   च.सु. ७/४०

In the above reference *Anushaya* refers to close connection. Due to this, qualities of *doshas* are expressed on body called as *deha prakriti*. These expression expressed on body in the form of structure or morphology (*sharira swaroopa*), function or physiology, mental reactions or psychology.

Prakriti nirmanakara bhava

The *prakriti nirmankara bhavas* are explained by *acharya Charaka* given as, One (singal *dosha*), two (combination of two *dosha*) or three (combination of three *dosha*) *doshas* are responsible in formation of *prakriti*. There are also some factors on which the predominance of *dosha* is depends. They are Sperm and ovum (*shukrashoniprakriti*), season and conditions of uterus (*kalagarbhashayaprakriti*), age of women, food and regimens of the mother (*matruaaharvihar prakriti*), dominance of the *mahabhutas* (*mahabhutvikar*) comprising the foetus. The dominant *dosha* of these factors at the time of fusion, determine the physical constitution of an individual.

Types of *prakriti*

a. *Prakriti* as per *dosha*

The *prakriti* which is explained on the basis of *doshas* is called as *Sharir Prakriti* or *Deha Prakriti*, it is of seven types given as,

Prakriti formed from individual *doshas,*

1. Vataja prakriti

2. Pittaja prakriti

3. Kaphaja prakriti

Prakriti formed by combination of two *doshas* is,

1. *Vata-pittaja prakriti*
2. *Vata-kaphaja prakriti*
3. *Pitta-kaphaja prakriti*

Prakriti formed by combination of three *doshas* is,

1. *Tridoshaja prakriti.*

b. *Prakriti* as per *guna*

The *prakriti* which is explained on the basis of *gunas* (due to reflection of psychological effects) is called as *Manas Prakriti*, it is of three types given as,

1. *Satvaja*
2. *Rajasa*
3. *Tamas.*

c. *Bhautic prakriti*

Acharya Sushruta explained *prakriti* according to panchamahabhutas. He considered *vata, pitta, kapha prakriti* do include *vayu mahabhuta, teja mahabhuta* and *prithvi mahabhutas prakriti* respectively.

d. *Jatyadi prakriti*[9]

Acharya charaka in *indriyasthana* classified the *prakriti* on the basis of *varna, jati, kula, desha, vaya.* This are enlisted below.

1. *Jati prasakta prakriti.*
2. *Kula prasakta prakriti.*
3. *Deshanupatini prakriti.*
4. *Kalanupatini prakriti.*
5. *Vayanupatini prakriti.*
6. *Pratyatmaniyatatva prakriti.*

Ayurvedic review of *bala*
Dehabala

The *Dehabala* is nothing but the strength of a person which helps to do any work i.e.capacity of an individual to perform work. *Acharya charaka* in *samhanan pariksha* says that one whose *sharira mamsa* and *sharir samhanan* are even in measurement are said to be *susahant sharir* person.Such person has good strength.

Definations

प्राकृतस्तु बलं श्लेष्मा विकृतो मल उच्यते।

स चैवौज: स्मृत: काये स च पाप्मोपदिश्यते॥[10]   च.सु.-१७/११७

In this reference *acharya charaka* says that *Kapha* in normal condition can be said as *bala* but in abnormal condition it is waste. Normal *kapha* in *sharira* is called as *oja* while *vikrut kapha* is called as *pap* i.e. disease.

Balavriddhikara dravya

Acharya Bhavprakash for the person willing to increase their *bala*, suggest some characteristics of drugs which are given below,

दोषसाम्यकरं यत्तु वन्हिसाम्यकरं च यत्।

धातुपुष्टिकरं द्रव्यं बलं तदभिवर्द्देयेत्॥[11]   भा.प्र.पु.-७/११७.

Doshasamyakar dravya are the drugs which maintain balance of *doshas*, also capabale to increase the *bala* in the human beings. Because when *doshas* are in unbalanced state they causes decrease in *bala* while when they are in balanced state they are responsible for health.*Vanhisamyakar dravya* are the drugs which causes balance of *agni*. Also helps in improvement of *bala*. Because it is believed that, on *agni* strength, health, lifespan, and vital breath depend. *Dhatupushtikar dravya* are helps in improvement of *dhatu sarataha*. Which again help in gaining the *bala*. Because this *dhatu saratah* is the base of *bala*.

Types of *bala*

1. This classification is based on physical strength i.e. working capacity of body which is listed as.[12]

1. *Pravara bala*
2. *Madhya bala*
3. *Avara bala*.

2. The given classification is based on origination of *Bala*

1. *Sahaja Bala*
2. *Kalaja Bala*
3. *Yuktikrta Bala*

1. *Sahaja bala*

It can be called as congenital *bala* i.e (genetic or inborn) as it is present since birth. Congenital is that which is natural to the body and mind. It is also refered as *Prakrita* (natural) and it is present from the birth. This *Bala* is essential in every individual.It is increase with the growth of *sapta dhatus* and does not depend upon other reasons.

2. *Kalaja bala*

It is also called as time effected in modern science. Time-effected is due to seasonal variation and age factor.

3. *Yuktikruta bala*

It is an acquired one. Acquired *bala* is due to proper management of diet & exercise. This type of *bala* includes the induction of body's resistance by rehabilating the proper nutrition. Among the three types of *bala* the *Yuktikruta bala* is the *bala,* which could be increased by genuine and regular efforts.My work belongs to *yuktikruta bala.*

Physical fitness[13]

Physical fitness is defined as a general state of health and specifically the ability to perform aspects sports or occupations. To achive good strength person should take correct nutrition. He should exercised regularly. He should take proper hygiene and adequate rest. There are some factors which affects the physical performance these are Age, somatotype, personality, diet and drugs. Also some other factors can affect performance such as physical factors, psychological or external factors.

Table Showing comparison between the *Sharir bala* and Physical fitness.[13]

	Sharir Bala	Physical Fitness
1.	Determine the *karma samarthya*	Determine the capacity to work
2.	Can be enhanced by *vyayama,aushadha*	Can be enhanced by Exercise and Drugs
3.	Related to all the *Doshas*, *Dhatu* etc	Relaed to all the body tissue and systems.

Table Showing factors influencing Physical Fitness and *Sharir Bala.*[13]

	Sharir Bala	Physical Fitness
1.	*Vaya*, *Desha*, *Kala*	Age,place of living, birth, season
2.	*Prakriti*	Genetics
3.	*Vyayama*	Exercise
4.	*Aushadi- Balya*, *Rasayana Vajikarana dravyas*.	Drugs- Anabolic steroids Etc.

***Vyayama lakshanas* and Physical fitness parameters**

The physical fitness parameters like Duration of exercise, Exhausation, Physical fitness index, heart rate are the indicators of *vyayama lakshanas*, viz *karma samarthya*, *swedagama*

i.e perspiration, *shrama sahishnuta*, *Shwasa vruddi* i.e increased respiration respectively. These are related to physical fitness i.e *sharir bala*.

Vyayama

Like proper diet and sleep *Vyayama* is also important for good health. It causes lightness in body, improves *agni*, reduces fat, increase pain tolerance capacity etc. Due to *Vyayama* the food with opposite properties, mixed or heavy to digest gets digested quickly. It maintains equilibrium in body. Exercise should be avoided in child and old age. To maintain health and to reduce risk of health problems, health professionals and researches recommend a minimum of 30 min moderate exercise per day. The genetic variations with respect to individual responses to exercise have also been reported which may be relevant in context of *prakriti*. Various aspects of *Vyayama* like adequate exercise, indications contraindications etc have been described in detail in *Ayurveda*.

MATERIAL AND METHODS

Material

- Literary reviews of *Dehaprakriti*, *Dehabala* and *Vyayama* were taken from various *Samhita* including *Bruhattrayis* and *Laghuttrayis* and their concerned commentaries.

- By the standard chart of *prakriti parikshan* each volunteer was examined and *prakriti vinishchaya* was done.

- With the help of Harvard step test *deha bala parikshan* of each volunteer was done according to the parameter.

Methodology

Type of study – An observational cross sectional study.

Place of study- *Ayurved* College and Physical Education College from the area of study centre were selected.

Sample size-Total 200.

Group A   n=100 (Professional college students).

Group B   n=100 (Physical education college students).

Sampling technique - Simple random method.

Inclusion criterias

- Healthy Students from professional and physical education colleges.

- Students aged between years 18 to 26 yr.

- Students irrespective of gender, cast, religion, economic status.

Exclusion criterias

- Students having any systemic disorder.
- History of any physical or psychiatric illness.
- Students with any addictions or under the influence of any medication.
- Professional college students doing regular exercise.

Criteria for assessment

1. General Examination

General examinations of every Student are done to assess their health status which includes height, weight, pulse and blood pressure examination.

2. *Ashtavidha pariksha*

According to *Acharya vagbhata*, Rogi or health of healthy individual should be examined by three fold of examination i.e. *Darshana*, *Sparshana, Prashnana Pariksha*. Hence here *Ashtavidha pariksha* was done.In which nadi, mala, mutra, Jivha, Shabda, sparsh, druk and aakruti is examined.

3. *Deha prakriti parikshana*

The *Dehaprakriti* assessment was done with the help of CENTRAL COUNCIL FOR RESEARCH IN *AYURVEDA* AND *SIDDHA's* questionnaire formate for *prakriti* assessment.This questionnaire contains four types of status these are physiological, mental or psychological, physical and social on the basis of this the assessment has to be done.

Balardha vyayam lakshana

Harvard step test is used for the assessement of *dehabala* on the basis of following two *lakshanas*,

1. *Swedapravritti*
2. *Mukhashosha*.

Harvard step test is used as good measured of fitness.In this test the subject step up and down on bench having height of 20 inch for male and 18 inch for female. At the rate of 30 steps per minute.The rate is held until appearance of *Balardha vyayam lakshanas*.[15]

S.n	Appearance of *lakshanas* in minutes	*bala pariksha*
1	Less than 5 mintues	*Alpa bala.*
2	More than 5 minutes and less than 10 minutes	*Madhyam bala.*
3	More than 10 minutes and Less than 15 minutes	*Uttam bala.*

Objective parameter

Bala parikshan (Physical fitness) by harvard step test

Classification of fitness according to fatigue index

Fatigue index	Grades	Bala
Below 55	Poor	*Alpa bala*
55-64	Low average	*Madhyam bala*
65-79	Average	*Madhyam bala*
80-89	Good	*Uttam bala*
above 89	Excellent	*Uttam bala*

Vyayama Shakti and Bala

Alpa, Madhyam, Uttam Vyayamshakti indicates *Alpa, Madhyam, Uttam bala* respectively.

Which was assessed by *Balardha vyayama lakshana* and Harvard step test,

The Physiological parameters like,

1. Blood pressure

2. Pulse rate

3. Respiratory rate is observed before and after the Harvard step test.The mean difference observed in the readings of above parameter before and after the test in both the group, take into consideration to compare fitness (*Dehabala*) of students.

OBSERVATIONS AND RESULT

Group A – Professional College students.

Group B – Physical education college students.

Table Showing Association between *Deha prakriti* and *Deha bala* in Group A.

Deha Prakriti	Deha bala			d.f.	Chi-sq statistic	P-value
	Alpa	**Madhyam**	**Uttam**			
Kapha-Pitta	4	11	6	10	21.21	0.020
Kapha-Vata	4	6	3			
Pitta-Kapha	6	13	2			
Pitta-Vata	9	6	2			
Vata-Kapha	7	3	2			
Vata-Pitta	13	2	1			

In students of professional college, the *Deha bala* and *Deha prakriti* was seen to be significantly associated (P-value = 0.020) at 5% level of significance as per the chi-square test of independence. Hence, for students of professional college, *Deha prakriti* and *Deha bala* are associated.
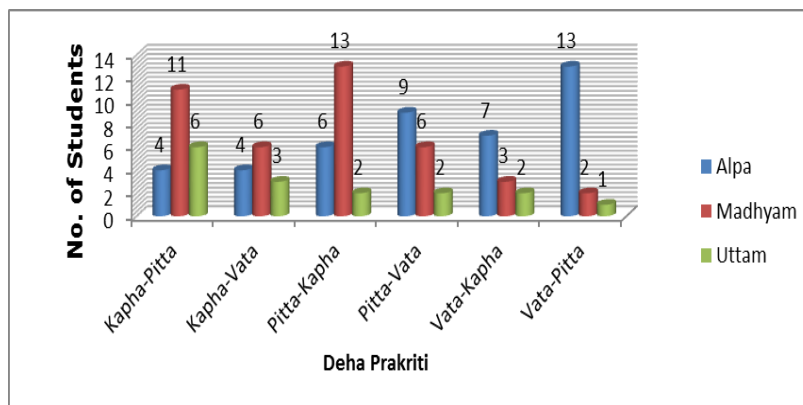

Figure no. 1.

Table showing Association between *Deha prakriti* and *Deha bala* in Group B.

Deha prakriti	Deha bala			d.f.	Chi-sq statistic	P-value
	Alpa	Madhyam	Uttam			
Kapha-Pitta	4	8	8	10	33.264	< 0.001
Kapha-Vata	3	8	7			
Pitta-Kapha	4	15	7			
Pitta-Vata	2	7	3			
Vata-Kapha	4	4	1			
Vata-Pitta	13	2	0			

In students of physical education college, the *Deha bala* and *Deha prakriti* was seen to be significantly associated (P-value < 0.001) at 5% level of significance as per the chi-square test of independence. Hence, for students of physical education college, *Deha prakriti* and *Deha bala* are associated.
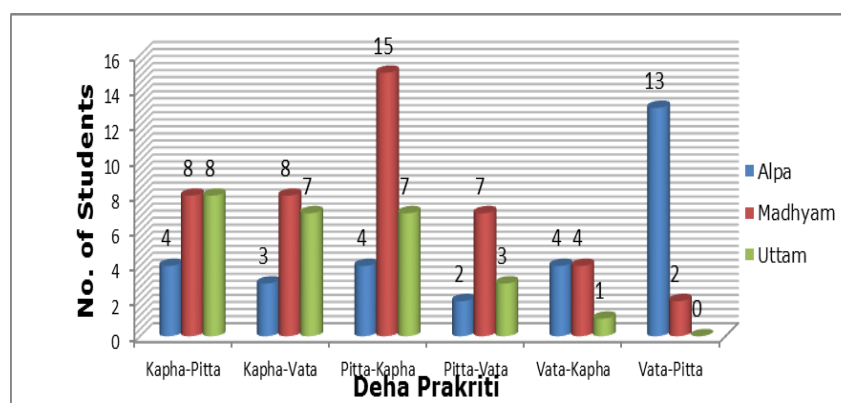

Figure no. 2.

Comparative analysis

Dehabala and PFI-physical fitness index

Chi square (X^2) value for Professional college students	146.88
Chi square (X^2) value for Physical education college students	159.61

Chi square (X^2) value for Physical education college students is greater than the Chi square (X^2) value for Professional college students, so we should reject the null hypothesis and accept the alternative hypothesis i.e. there is a difference between *Dehabala* of Professional and Physical education college students.

Comparative analysis for objective criteria

All the values in following tables are calculated by using Unpaired t test for the objective criteria. Let us see the statistical analysis for every parameter separately.

Sr. no	Variables	Mean diff. Group A	Mean diff. Group B	Combined SD	Combined SE	Unpaired t value	p	Result
1	Systolic BP	15.92	11.41	3.68	0.54	8.251	<0.05	S
2	Diastolic BP	0.8	0.56	1.40	0.199	1.20	>0.05	NS
3	Pulse rate	23.5	19.1	12.95	1.83	2.41	<0.05	S
4	Respiratory Rate	20.1	16.22	5.36	0.75	5.41	<0.05	S

DISCUSSION

Whenever a researcher is going to establish the theory the way of its journey should follow the steps. While doing research it should be completed by drawing conclusion on the basis of findings from observation and results.

Dehabala and *dehaprakriti* association in both groups

As value of p = 0.020 in group A and less than 0.001 in group B at 5% level of significance as per the chi-square test of independence shows the association between *Deha prakriti* with *deha bala*. In both the group it was observed that *kapha Pradhan prakriti* is strongly associated with *Uttam bala*. *Pitta Pradhan prakriti* is strongly associated with *Madhyam bala*. *Vata Pradhan prakriti* is associated with *alpa bala*. In *Ayurvedic samhitas* information has been quoted by various *acharya* about *Dehaprakriti lakshanas* related with *Dehabala* as, in *Vata prakriti* features *acharya charaka* stated that *vata prakriti* person has *alpa bala*.In *Pitta prakriti* features *acharya charaka* stated that *pitta prakriti* person has *Madhyam bala*. In

Kapha prakriti features *acharya charaka* stated that *kapha prakriti* person has *Uttam bala*.Here same thing has been proved once again.

Dehabala and Physical fitness association

The present study shows that there is association between the physical fitness and *deha bala*. The volunteer having *madhyam bala* has moderate physical fitness the volunteer having *alpa bala* has the poor physical fitness and the volunteer having *Uttam bala* has good or excellent physical fitness.

Dehabala and Physical fitness in both the group

Chi square value for Group A is 146.88 while Chi square value for Group B is 159.61, Chi square value for Group B (Physical education college students) is greater than the Chi square value for Group A (Professional college students), so we should reject the null hypothesis and accept the alternative hypothesis i.e. there is a difference between Dehabala of Professional and Physical education college students.

Blood pressure

In the present study the Blood pressure is measured before and after the Harvard step test and mean difference was calculated which shows significantly more value in Group A than the mean difference calculated in Group B (physical education college students). The variation occurs will take more time to recover in group A than group B.Less will be the time of recovery in Group B indicates more of physical fitness(strength). The mean difference calculated for diastolic blood pressure shows statistically insignificant in both group. Diastolic blood pressure is the measure of the pressure in the blood vessels between the heart beats. It shouldn't change during exercise or might show very little changes.

Respiratory rate

The respiratory rate increases during exercise to make sure that more oxygen is absorbed into the blood and more carbon dioxide is remove from it. In both the groups there is increase in the respiratory rate but the mean difference observe for group A(professional college students) is more than group B (physical education college students).Because the effect of regular physical exercise in group B increases the efficiency of respiratory muscles. The variation occurs will take more time to recover in group A than group B.Less will be the time of recovery in Group B indicates more of physical fitness(strength).

Pulse rate

The mean difference calculated of pulse rate shows significantly more value in group A (professional college students) than the mean difference calculated in group B(physical education college students). The variation occurs will take more time to recover in group A than group B.Less will be the time of recovery in group B indicates more of physical fitness (strength).

CONCLUSION

The physical activities of person is depends on various factors but ultimately on the *dehabala*. Thus decrease or other problems with *dehabala* is not good for any person. *Yuktikruta bala* is the *bala* which could be increased by sincere efforts. In physical education college students because of their course of education which includes sports and various types of exercises helps in improving this *bala*. The study lighted on the importance of *Vyayama* in today's life.The regular physical exercise has beneficial effect on various body system. *Ayurveda* says that there is no other vital tool like *vyayama* to achive stability. So regular physical exercise should be included as a part of education to gift physically fit youth to our country.

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