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DIAGNOSTIC STUDY OF VARIOUS PARAMETERS OF VITAL CAPACITY AMONG EXERCISERS AND NON EXERCISERS OF MIDDLE AGED MEN

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ABSTRACT

The purpose of the study was to analyse the comparison between vital capacity of exercisers and non exercisers male of middle aged men from various places of Punjab and Haryana. To determine this, 100 exercisers who were involved in any type of exercisers, regularly atleast for half an hour and 100 non exercisers who did not indulged in any type of exercise were randomly selected as subjects. To measure various selected variables of vital capacity i.e F.V.C(L), F.E.V1(L), FEV1/ FVC%(L/S), PEF(L/S), FEF(25-75%)L/S, Vmax25%, Vmax50%, Vmax75% spirometer was used. To analyse the computed scores of both the groups on vital capacity level, the't' test was employed. Out of eight variables six variables showed significant differences. Following are the 't' values of variables F.V.C(L) 4.02, F.E.V1(L) 4.74, PEF(L/S) 2.87, FEF(25-75%)L/S 2.79, Vmax25% 2.91, Vmax50% 2.79, which were found significant at .05 level but the 't' test values of FEV1/ FVC%(L/S) and Vmax75% were 1.87 and 1.85 respectively and no significant difference was found.

Keywords: Vital Capacity, Exercisers and Middleage.

INTRODUCTION:

From the primitive times itself people were engaged in vigorous physical activities in order to survive. They had been running from one place to other in search of food and shelter and they had to be strong and alert against environmental disasters and attack of wild animals. So, basic activities like running, jumping, throwing etc. were the common activities of their daily schedule.Aristotle has stated that "the quality of life is determined by its activities." In today's mechanical and modernized world the changing economic conditions and life styles further support the importance of physical exercises. With the technological advancement and increased

use of computers manual work has given way to the factory assembly line and sedentary office jobs.

Regular physical exercises throughout life significantly reduce the risk of disability and premature death from stroke and heart diseases. It can also effectively alter many of the important risk factors for cardiovascular diseases by lowering body weight and total scrum cholesterol levels, and promoting the maintenance of normal blood pressure. The physical exercises performed aerobically and an-aerobically have different effects on the human body. In other words, the goal or purpose of exercise decides its effects on human body. The adaptive capacity of the individual to the rigorous of work is determined by his physical fitness. The capacity for physical work of an individual can be defined in terms of his capacity to consume oxygen maximally and this can be predicted by simpler indirect methods like sub-maximal heart rate.

Oxygen is involved in the process of metabolism, which converts food into energy, we need to live. The by- product of metabolism is carbon dioxide. The lungs removes carbon dioxide from the blood as it is returned from the tissues. When the build up, resulting in 'acidosis' an acid poisoning of all cells of the body. The brain, heart and other organs are also impaired by carbon dioxide retention. Understanding the lungs would be easy if they simply exchanged oxygen and carbon dioxide, but they do much more. The effect of aging on total lung capacity is controversial. From the studies of various researchers it is analysed that total lung capacity decreases and stays the same in individuals after the age of 50 (Berglund, E., G. Birath, J. Bjure, G. Armby, I. Kjellmer, L. Sandqvist, and B. Soderhol (1963); jain and gupta, 1974a, 1974b; Johnson and Dympsey, 1991: Kenney, 1982; Stanescu, S., Q. St. Dutu, Z. Jienescu, L. Hartia, N. Nicolescu, & F. Sacerdoteanu, 1974; Storstein and Voll, 1974) whereas research has firmly established that vital capacity and inspiratory capacity decreases with the age and that residual volume and functional residual capacity increase, thus changing the percentage of total volume that each occupy(I. Astrand, 1960; P.O. Astrand, 1952; Ericsson and Irnell, 1974; Slonum and Hamilton, 1976; Stanescu, S., Q.St. Dutu, Z. Jienescu, L. Hartia, N. Nicolescu, & F.

Sacerdoteanu, 1974; Turner, J.M., J. Mead, & M.E. Wohl, 1968) the forced expiratory volume in 1 sec (FEV1) and maximal voluntary ventilation decline steadily after approximately age of 35in both males and females (Ashley, F., W.B. Kannel, P.D. Sorlie, & R. Masson, 1975; Ericson and Irnell, 1974; Shepard, 1978; Slonim and Hamilton 1976; Stanescu S. Q. St Dutu, Z. Jienescu, L. Hartia, N. Nicolescu, & F. Sacerdoteanu, 1974). These declines are brought about by a combination of structural and mechanical changes in the respiratory system. These changes include (1) a decrease in elastic recoil of the lung tissue; (2) a stiffening of the thoracic cage, which decreases chest mobility, necessitating a greater reliance on the diaphragm; (3) a decrease in the intervertebral space, which in turn decreases height and changes the shape of the thoracic cavity; (4) losses in respiratory muscle force and velocity of contraction. Of all these changes, the loss of elastic recoil appears to be the most important (Johnson and Dympsey, 1991; turner, J.M., J. Mead, & M.E Wohl, 1968)

PROCEDURE

A comparative study has been designed to compare various parameters of vital capacity of exercisers and non- exercisers of middle aged men. For this purpose 200 sedentary and regular exercisers between 45-55 years were selected randomly. In the exercisers category only those subjects were included who were doing exercise regularly in the morning for at least 30 minutes. The nature of exercise was of any intensity. The following variables were selected to achieve the aim of the study.

1. Age (years)
2. Height (Cm)
3. Weight (Kg)
4. Forced Vital Capacity, FVC (L)
5. Volume Exhaled after 1 second, FEV 1 (L)

6. FEVI/FVC%

7. Peak Expiratory Flow rate, PEF (L/s)

8. Average expiratory flow between FEF 25-75% (L/s)

9. Expiratory flow at Vmax25% (L/s)

10. Expiratory flow at Vmax50% (L/s)

11. Expiratory flow at Vmax75% (L/s)

Vital capacity was measured with the help of spirometer. FVC, FEV1 were measured in litres, PEF, FEF 25-75%, FVC, Vmax25%, Vmax50%, Vmax75% were measured in litre per second.

To measure various parameters of vital capacity, the equipment used were a Computer set, computerized Spirometer, a weighing machine and a measuring scale. The test was administered on subjects one by one from different places namely Amritsar, Rohtak, Patiala, Sirsa and Chandigarh. The subjects were given general information about the test to be administered on them, and then a demonstration was given so that everything was clear to them, what actually they were supposed to do. The subject put the Mouthpiece or sensor of the spirometer into his mouth, then took deepest breathe as he could and then forcefully exhaled all air into the sensor as hard as possible. Three recordings were taken at one-minute intervals and the average of the three highest readings was noted. Subjects were asked to inhale maximally following a maximum expiration. The system automatically retained the best test. Two curves were shown on the screen of the computer after the test: the flow-volume loop and volume-time curve. System automatically calculated the actual values. These readings were saved and then the next subject was asked to perform the same test. The graphs were plotted and printed and the variables were recorded.

Then the collected data was analysed and compared with the help of statistical procedure in which arithmetic mean, standard deviation and df and t test (of FVC, FEV1, FEV1/ FVC%, PEF, FEF (25-75%) Vmax25%, Vmax 50%, Vmax 75%) were used to compare the data.

STATISTICAL DESIGN

The main purpose of the study was to compare the vital capacity of exercisers and non exercisers men of middle aged group. The scores achieved from the exercisers and non exercisers men as result of application of selected vital capacity variables were taken with computerized Spirometer. The data of groups, 100 exercisers and 100 non exercisers men of middle aged were calculated separately for all the variables. To know the difference in the selected variables the "t- test" was used.

FINDINGS

Different types of descriptive statistic such as mean and standard deviation was computed to describe each variable statistically. The level of significance was set at .05 its results have been depicted in the following tables.

TABLE-1

MEAN AND STANDARD DEVIATION OF SELECTED VITAL CAPACITY COMPONENTS OF NON EXERCISERS MEN

SR.NO.	VARIABLES	UNITS	MEAN	S.D.
1	FVC	Litres	4.36	0.713
2	FEVI	Litres	3.51	.727
3	EVI/FVC%	Litre/Second	81.15	13.44
4	PEF	Litre/Second	8.50	2.82
5	FEF (25-75%)	Litre/Second	5.84	1.68
6	Vmax 25%	Litre/Second	7.82	2.86
7	Vmax 50%	Litre/Second	6.70	2.25
8	Vmax 75%	Litre/Second	3.50	1.04

The table 1 depicts the mean values of eight variables of non exercisers. These values were recorded as variable wise, FVC 4.36 and .713 respectively, FEV1, 3.51 and .727 respectively, FEV1/FVC% 81.15 and 13.44 respectively, PEF 8.50 and 2.82 respectively, FEF (25-75%) 5.84 and 1.68 respectively, Vmax 25% 7.82 and 2.86 respectively, Vmax 50% 6.70 and 2.25 respectively, VMax 75% 3.50 and 1.04 respectively.

The FVC and FEV1 variables were measured in litres whereas FEV1, FEV1/FEC%, PEF, FEF (25-75%, Vmax25% (L/s), Vmax50%(L/s), Vmax75%(L/s) were measured in litre per seconds.

TABLE-2

MEAN AND STANDARD DEVIATION OF SELECTED VITAL CAPACITY COMPONENTS OF EXERCISERS

SR.NO.	VARIABLES	UNITS	MEAN	S.D.
1	FVC	Litres	5.15	.510
2	FEVI	Litres	4.51	.604
3	EVI/FVC%	Litre/Second	87.39	6.38
4	PEF	Litre/Second	11.15	3.00
5	FEF (25-75%)	Litre/Second	7.39	1.83
6	Vmax 25%	Litre/Second	10.59	3.13
7	Vmax 50%	Litre/Second	8.62	2.44
8	Vmax 75%	Litre/Second	4.10	1.03

The table 2 indicates the mean values of eight variables of exercisers. These values were recorded as variable wise, FVC 5.15 and .510 respectively, FEV1 4.51 and .604 respectively, FEV1/FVC%87.39 and 6.38 respectively, PEF 11.15 and 3.00 respectively, FEF (25-75%) 7.39

and 1.83 respectively, Vmax25% 10.59 and 3.13 respectively, Vmax50% 8.62 and 2.44 respectively, Vmax75% 4.10 and 1.03 respectively.

TABLE-3

MEAN DIFFERENCE BETWEEN EXERCISERS AND NON EXERCISERS

ON THE FVC VARIABLE.

GROUP	MEAN	S.D	Df	't'-Value
NON EXERCISERS	4.36	0.713	98	4.02*
EXERCISERS	5.15	0.510		

Level of Significance .05 Tab. "t-value" at .05(1.99)

Table 3 shows that the mean and standard deviation values with regard to non exercisers on the FVC(L) variable were 4.36 and .713 whereas in the case of exercisers the same were 5.15 and .510 respectively. So it indicates that there has been a significant difference between exercisers and non exercisers males. The calculated t-value (4.02) which is more than tabulated t-value at .05level.

TABLE-4

MEAN DIFFERENCE BETWEEN EXERCISERS AND NON EXERCISERS ON THE FEV1 VARIABLE.

GROUP	MEAN	S.D	Df	't'-Value
NON EXERCISERS	3.51	0.727	98	4.74*
EXERCISERS	4.51	0.604		

Level of Significance .05 Tab. "t-value" at .05(1.99)

Above table displays the mean and standard deviation values with regard to non exercisers on the FEV1 (L) variable were 3.51 and .727 whereas in the case of exercisers the same were 4.51 and 0.604 respectively were valued significance difference between exercisers and non exercisers men. The calculated t-value (4.74) was more than tabulated t-value at .05 level.

TABLE-5

MEAN DIFFERENCE BETWEEN EXERCISERS AND NON EXERCISERS ON THE FEV1/FVC% VARIABLE.

GROUP	MEAN	S.D	Df	't'-Value
NON EXERCISERS	81.15	13.44		
EXERCISERS	87.39	6.38	98	1.87

Level of Significance .05 Tab. "t-value" at .05(1.99)

Table 5 describes the mean and standard deviation values with regard to non exercisers on the FEV1/FVC%(L/s) variable were 81.15 and 13.44 whereas in the case of exercisers the same are 87.39 and 6.38 respectively. It indicates that there was no significant difference between recreational exercisers and non exercisers, as the calculated t-value (1.87) was less than tabulated t-value at .05 level.

TABLE-6

MEAN DIFFERENCE BETWEEN EXERCISERS AND NON EXERCISERS ON THE PEF VARIABLE.

GROUP	MEAN	S.D	Df	't'-Value
NON EXERCISERS	8.50	2.82		
EXERCISERS	11.15	3.00	98	2.87*

Level of Significance .05 Tab. "t-value" at .05(1.99)

Table 6 indicates that the mean and standard deviation values with regard to sedentary on the PEF(L/s) variable were 8.50 and 2.82 whereas in the case of exercisers the same were 11.15 and 3.00 respectively. So it indicates that there has been a significance difference between exercisers and non exercisers men. The calculated t-value (2.87) was more than tabulated t-value at 0.5 level.

TABLE-7

MEAN DIFFERENCE BETWEEN EXERCISERS AND NON EXERCISERS ON THE FEF(25-75%) VARIABLE.

GROUP	MEAN	S.D	Df	't'-Value
NON EXERCISERS	5.84	1.68	98	2.79*
EXERCISERS	7.39	1.83		

Level of Significance .05 Tab. "t-value" at .05(1.99)

Table 7 exhibits the mean and standard deviation values with regard to non exercisers on the FEF(25-75%)L/s variable were 5.84 and 1.68 whereas in the case of exercisers the same were 7.39 and 1.83 respectively. So it also indicates that there has been a significance difference between exercisers and non exerciser men. The calculated t-value (2.79) was more than tabulated t-value at .05 level.

TABLE-8

MEAN DIFFERENCE BETWEEN EXERCISERS AND NON EXERCISERS ON THE VMAX25% VARIABLE.

GROUP	MEAN	S.D	Df	't'-Value
NON EXERCISERS	7.82	2.86	98	2.91*
EXERCISERS	10.59	3.13		

Level of Significance .05 Tab. "t-value" at .05(1.99)

Table 8 reveals that the mean and standard deviation values with regard to non exercisers on the Vmax25% (L/s) variable were 7.82 and 2.86 whereas in the case of exercisers the same were 10.59 and 3.13 respectively. So it indicates that there has been significance difference between exercisers and non exercisers. The calculated t-value (2.91) was more than tabulated t-value at .05 level. TABLE-9

MEAN DIFFERENCE BETWEEN EXERCISERS AND NON EXERCISERS ON THE VMAX50% VARIABLE.

GROUP	MEAN	S.D	Df	't'-Value
NON EXERCISERS	6.70	2.25	38	2.79*
EXERCISERS	8.62	2.44		

Level of Significance .05 Tab. "t-value" at .05(1.99)

Table 9 shows that the mean and standard deviation values with regard to non exercisers on the Vmax50% (l/s) variable were 6.70 and 2.25 whereas in the case of exercisers the same were 8.62 and 2.44 respectively. It indicates that there has been a significance difference between recreational exercisers and non exercisers. The calculated t-value (2.79) was more than tabulated t-value at .05 level. TABLE-10

MEAN DIFFERENCE BETWEEN EXERCISERS AND NON EXERCISERS ON THE VMAX75% VARIABLE.

GROUP	MEAN	S.D	Df	't'-Value
NON EXERCISERS	3.50	1.04	38	1.85
EXERCISERS	4.10	1.03		

Level of Significance .05 Tab. "t-value" at .05(1.99)

Table 10 depicts that the mean and standard deviation values with regard to non exercisers on the Vmax75%(L/s) variable were 3.50 and 1.04 whereas in the case of exercisers

the same were 4.10 and 1.03 respectively. So it indicates that no significant difference has been found between recreational exercisers and sedentary males as the calculated t-value (1.85) was less than tabulated t-value at .05 level.

DISCUSSION OF FINDINGS

The results of the study revealed that the regular exercisers have better vital capacity in comparison to non exercisers. It is also analysed that the exercisers and physical activities increases the level of vital capacity which makes the people physiologically fit and active and they also have greater ventilator endurance. The statistical analysis showed that there were significant differences between exercisers and non exercisers in six variables. The 't' value at FVC(L) being 4.02 whereas in FEV1(L) it was 4.74 , in PEF(L/s) it was 2.87, in FEF(25-75%) it was 2.79, in Vmax25%(L/s) it was 2.91 and in Vmax 50%(L/s) it was 2.79, which were found statistically significant at .05 level but in FEV1/FVC%(L/s) AND Vmax75%(L/s) it were 1.87 and 1.85 respectively and was found no significant difference.

CONCLUSION

On the basis of the findings of the study following conclusions were drawn:

1. Exercisers were comparatively better than non exercisers in variables F.V.C(L), F.E.V1(L), PEF(L/S), FEF(25-75%)L/S, Vmax25%(L/S), Vmax50%(L/S). Thus it can be concluded that exercisers have higher vital capacity than non exercisers men.

2. There were no significant differences in two variables FEV1/FEV%(L/s) and Vmax75%(L/s) because age affects the vital capacity of a person. As the person ages, the natural elasticity of the lungs decreases. This translates into smaller lung volumes and capacities as the person grows older. In the study conducted by Dempsey and seals (1995) it was revealed that relate changes in pulmonary architecture that included decreased elastic lung recoil, increased stiffness of the chest wall, and reduced respiratory muscle strength results in decreased pulmonary function.

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