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The Effect of Physical Effort on Some Blood Components and the Level of Dyspnea in Patients with Chest Wall Disease for Smokers and Non-Smokers

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1. Introduction:

Chest wall disorders are a group of thoracic deformities that result in inefficient coupling between the respiratory muscles and the thoracic cage. The disorders are usually characterized by a restrictive defect and share the potential of long term hypercapnic respiratory failure, the most common chest wall abnormality leading to respiratory failure is Thoracoplasty, Scoliosis and/or kyphoscoliosis may also cause severe respiratory failure, symptoms of respiratory failure include: dyspnoea on exertion, peripheral oedema, orthopnoea, repeated chest infections, morning headaches, fatigue, poor sleep quality and loss of appetite.

Dyspnea is the term generally applied to sensations experienced by individuals who complain of unpleasant or uncomfortable respiratory sensations such as chest wall diseases, Many definitions of dyspnea have been offered, including: "difficult, labored, uncomfortable breathing" an "awareness of respiratory distress", "the sensation of feeling breathless or experiencing air hunger", and "an uncomfortable sensation of breathing"(Wright., and Branscomb., 1954, Wasserman., and Cassaburi., 1988, Simon., *et al*., 1989).

The sensation experienced by an individual during physical effort will evoke very different reactions than the same sensation occurring at rest, physical effort is impact in symptoms of dyspnea, quality of life, and functional capacity in patients with chest wall diseases who continuous with smoking more than non-smoking and may also have a favorable impact on mortality and hospitalizations, the sensation of dyspnea is increased in patients with chest wall diseases by routine duties which require arm and leg use, especially activities which involve high effort (Breslin, 1992).

Tobacco smoking is the main etiological factor for the development of chest wall diseases, cigarette smoking is estimated in western societies to account for around 85% of the risk of developing chest wall diseases, Eagan *et al*. (2004) reported that the risks of dyspnea, cough, wheezing and mucous production are increased by active cigarette smoking and that these features are directly related to the amount of cigarettes smoked.

The aim of smoking cessation is to slow the rate of decline of ventilatory function, dyspnea, and disability (John *et al*., 2000). After cessation of smoking, the progressive decline in lung and airway function returns to levels that are normally associated with ageing (Anthonisen *et al*., 1994; Fletcher and Peto, 1977). Indeed, there is often a small improvement in chest wall diseases within a year after cessation of smoking, compared with the accelerated rate of decline in those patients who continue to smoke (Anthonisen *et al*., 1994; Fletcher and Peto, 1977; Ribarren *et al*., 1999).

Physical effort is effected some blood components such (cholesterol, white blood cell count, Red blood cell count, Hemoglobin and PCV), current study showed the changes that occur in blood after effort in patients with chest wall diseases and related it with dyspnea in the same patients. Hence the importance of research to provide accurate scientific information on the occuring changes in some blood components to the athletes of smokers and non-smokers and of (hemoglobin of red and white blood and PCV and cholesterol) and relate of those changes to dyspnea in patients with chest wall diseases.

Little is known about effect physical effort on blood components and levels of dyspnea in patients with chest wall diseases, numerous studies found the effect of training in COPD and asthma patients, no one yet studied the relation between blood changes and dyspnea and effort in patients with chest wall diseases especially with smokers and non-smokers.

2- Methodology:

Study used descriptive approach because it is more suitable to the nature of the study, the researchers applied the tests on January 15. 2012 to March 15, 2012.

2-1 Subjects:

Patients with chest wall diseases volunteered for the study reported here. Patients were initially provided with a verbal explanation as to the nature of the study, including risks, benefits and the time commitment required. From a total of 85 patients in the group. Because some patients failing to continue with our tests, the final sample size was 60 with 30 patients in the smoking group and 30 in the non-smoking group. The students were a mix of sex (40 males, 20 females) and age (range 45–55 years).

2-2 Study Design:

The proposed study required recruitment of chest wall patients and age and sex matched controls. All participants (smoking patients and non-smoking patients) commenced the tests by reporting to lap of Morjan Hospital in Babylon City (Iraq) to complete baseline measurements over 2 main testing sessions (denoted below). Participating chest wall patients randomised into two groups where they completed a specific testing for a period of 2 weeks. The participants completed the physical effort before testing and the time of effort was half hour by using treadmill, the speed of treadmill was slow, the tests achieved for two times before effort and after.

2-3 Study Tests:

- Blood Tests:

Blood samples were taken before and after physical effort from two groups smoking and non-smoking patients and sent to lap for analysis, the blood tests were (WBC, RBC, PCV, and Cholesterol).

- Severity of Dyspnea:

A visual analogue scale (VAS) (as used by Donner & Muir, 1997; Shahin *et al*., 2008 and Wilson & Jones, 1991) used to quantify the severity and progression of dyspnea (see figure 1). The VAS is a 100 mm scale with severity descriptors, such as "no change in breathlessness" and "great breathlessness" which correspond to markings along the scale (Donner and Muir, 1997). The VAS is simple to administer and has been found to be a valid measure of the intensity of breathlessness (Shahin *et al*., 2008), reliable over short periods of time, sensitive to change, and correlates with minute ventilation and oxygen consumption during exercise in subjects with chest wall disease (Mador *et al* 1995, Mahler 1992). For example, a difference of one point on the VAS has clinical significance (Solway *et al*., 2002). Furthermore, the VAS is a widely used tool for quantifying dyspnea during exercise testing in patients with chest wall diseases (Noseda *et al*., 1994).

2-4 Results and Discussion:

Results of the current study found that physical effort impacted in study variations and there was a significant different, table (1) showed means, standard deviation and T test between pre and post-tests for smoking group at variations of the study, the calculate T value of PCV was (5), it is larger than tabulate T value which is (2.57), the researchers see that results of PCV was high because of smoking, Mohammad and Abo Al-Aulla (1999) found that smoking leads to fatigue, heart failure, weakness and dyspnea to achieve physical activity.

Table (1)
shows means, standard deviations, and calculate and tabulate T value for smoking group.

Variations	Pre Test		Post test		Calculate T value	Significant
	Mean	standard deviations	Mean	standard deviations		
P.C.V	50.2	0.53	51.5	0.5	5	S
W.B.C	9700	35.35	9712.5	43.32	1.93	No S
R.B.C	5.57	0.04	5.85	0.71	8.4	S
Cholesterol	161.5	2.42	167.83	1.72	4	S
Dyspnea	6	1.6	8	2.6	3.9	S

Tabulate T value is (2.57) at significant level (5%) and freedom degree (5).

The calculate T value at WBC was (1.93), it is lower than tabulate T value which is (2.57), the researchers see that results of WBC was normal and smoking did not impact in WBC. Whereas RBC table (1) showed a significant different between pre and post-tests, calculate T value was (8.4) which is larger than tabulate T value (2.57), the researchers realized that physical effort had a huge effect on patients with chest wall diseases especially with RBC because physical effort results in increasing RBC account in blood to rise oxygen level that patients need it through effort, either about the relation between RBC and dyspnea and smoking, smoking results in

decreasing of oxygen that hold by RBC from lung to muscles, hence patients feel need to more oxygen to keep going with their activities, Sary and Norma (2001) found that smoking results in decreasing of oxygen that hold by RBC from lung to muscles with percentage of approximately 10% because of Nicotine in blood and correlate it with first of carbon oxide and hemoglobin and then will result in increasing of PCV and prevent of blood pass through blood vessels,

The calculate T value for cholesterol was (4), it is larger than tabulate T value which is (2.57), the researchers see that results of cholesterol was very high and smoking impacted in cholesterol level in blood. the researchers see that physical effort had a huge effect on patients with chest wall diseases especially with cholesterol because physical effort results in increasing cholesterol level in blood, Ali and Hilal (1997) found that cholesterol increased in patients with chest wall diseases after physical effort, also they discovered that cholesterol results in dyspnea due to it works to increased PCV and reduce amount of oxygen in blood and then feel with oxygen hungry.

The level of dyspnea showed in table (1) a significant different at error rate (5%) and the degree of freedom (5) between the two tests pre and post as the value of calculated T (3.9) which is greater than the value of tabular T (2.57), this means that the physical effort had an impact on the level of dyspnea in patients with chest wall disease of smoking group, the Cochrane, *et al*., (1990) showed that the physical effort have a clear impact on a tight airways as a result of increased amounts of oxygen entering and also pointed out that the importance of sports in improving the functioning of the lungs. So, the researchers believe that the physical effort impacted in patients with chest wall diseases.

Table (2) demonstrated that calculate T value of PCV was (1,34), it is lower than tabulate T value which is (2.57), the researchers see that results of PCV was low because patients didn't smoking, the result of PCV in patients who didn't smoking confirmed that physical effort doesn't impact on PCV and leads to increase the proportion of it, so the study confirms that smoking has more effect to increase the PCV ratio.

Table (2)
shows means, standard deviations, and calculate and tabulate T value for non-smoking group.

Variations	Pre Test		Post test		Calculate T value	Significant
	Mean	standard deviations	Mean	standard deviations		
P.C.V	46.5	0.5	47.5	0.5	1.34	No S
W.B.C	8178.75	69.31	8200	70.71	2.2	No S
R.B.C	7.45	0.05	9.37	0.03	9.7	S
Cholesterol	160.5	1.32	161.83	1.04	2.02	No S
Dyspnea	5	1.2	6	1.8	2.91	S

Tabulate T value is (2.57) at significant level (5%) and freedom degree (5).

The calculate T value of WBC was (2.2), it is lower than tabulate T value which is (2.57), the researchers see that results of WBC was normal and physical effort did not impact in it. Whereas RBC table (2) showed a significant different between pre and post-tests, calculate T value was (9.7) which is larger than tabulate T value (2.57), the researchers confirm that physical effort had a huge effect on patients with chest wall diseases especially with RBC because physical effort results in increasing RBC

account in blood to rise oxygen level that patients need it through effort but the increasing was not very high due to dyspnea, the physical effort leads to increased red blood cells and hemoglobin (Baha, 1990).

The calculate T value for cholesterol was (2.2), it is lower than tabulate T value which is (2.57), the researchers see that results of cholesterol was low and physical effort impacted in cholesterol level in blood and decrease it. the researchers see that physical effort had an effect on patients with chest wall diseases especially with cholesterol because physical effort in patients who don't smoking results in decreasing cholesterol level in blood.

The level of dyspnea showed in table (2) a significant different at error rate (5%) and the degree of freedom (5) between the two tests pre and post as the value of calculated T (2.91) which is greater than the value of tabular T (2.57), this means that the physical effort had an impact on the level of dyspnea in patients with chest wall disease of non-smoking group but less than smoking group.

4- Conclusions:

The researchers concluded that physical effort impacted largely on patients with chest wall diseases who smoking than patients who non-smoking and there was no significant change between two groups in WBC variation, dyspnea was high for two groups but non-smoking group was fewer, RBC was high in two groups but for non-smoking was best, in addition, researcher found that cholesterol in smoking group was higher than non-smoking group, dyspnea was also high in smoking group.

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