

CHAPTER IV

RESULTS

There were 80 subjects who voluntarily participated in this study. A Total of 29 subjects were excluded from the study because they were normal subjects with anemia (n=20), or they were COPD patients that could not be matched (n=9). Only 51 subjects were thus used for the study. They consisted of normal subjects (n=17) and COPD subjects (n=34).

According to their hemoglobin level, the COPD subjects were equally divided into two groups: the anemic group and the non anemic group (11.98 ± 0.73 g/dL vs. 13.08 ± 0.68 g/dL). Seventeen normal subjects were used as the control group. There were 10 men and 7 women in each group. Their demographic data are shown in Table 1. There were no statistically significant differences in age, weight, height, and BMI among the three groups. The smoking period was over 45 years in both the anemic and the non anemic group (50.53 ± 5.70 yrs and 49.76 ± 3.47 yrs, respectively). There was no smoker in the control group.

The FVC, the predicted FVC, the FEV₁, the predicted FVE₁, and the FEV₁/FVC ratio showed significant differences between the pathologic group and the control group ($p < 0.05$). The degree of the airway obstruction in the anemic group was comparable to that of the non anemic group. They were classified as moderate to very severe degree of COPD based on GOLD guidelines (1). The FVC and the predicted FVC were not significantly different between the anemic and the non

anemic group. However, the results showed that the anemic group was more likely to have the restrictive lung disease.

All subjects completed the 6MWT. The physiological responses during the 6MWT are shown in Table 2. The shortest mean walking distance was found in the anemic group compared with the non anemic and the control group (300.12 ± 88.55 m. vs. 390.12 ± 50.75 m. vs. 470.35 ± 43.10 m; $p < 0.05$).

The resting heart rate in the pathologic group was significantly higher than that of the control group. However, there was no significant difference in HR_{im}. The anemic group showed the highest resting heart rate and the highest HR_{im} among the three groups.

At rest, all the groups had a SpO₂ above 95% and there was no statistical difference in resting SpO₂ among the three groups. However, immediately after the test, a lower SpO_{2im} was found in the pathologic group compared with the control group ($p < 0.05$). Furthermore, the anemic group showed the lowest SpO_{2im} among the three groups ($84.82 \pm 6.69\%$ vs. $90.06 \pm 7.11\%$ vs. $96.65 \pm 2.62\%$; $p < 0.05$). There were no differences in blood pressure, dyspnea, and leg fatigue at rest and immediately after exercise among the groups (see Table.3)

Table 1. The subject's demographic data

Variables	Control group (n=17)	Pathologic group	
		Non anemic COPD (n=17)	Anemic COPD (n=17)
Age (yrs)	72.35 ± 5.06	71.24 ± 5.67	73.88 ± 5.57
Gender (M/F)	10/7	10/7	10/7
Weight (kg)	53.65 ± 4.30	50.65 ± 6.76	50.38 ± 7.41
Height (cm)	161.18 ± 6.72	159.41 ± 9.36	157.88 ± 8.22
BMI (kg/m ²)	20.65 ± 1.25	19.92 ± 2.04	20.19 ± 2.42
Period of smoking (yrs)	0	49.76 ± 3.47	50.53 ±
Hemoglobin (g/dL)	13.08 ± 0.68 ^a	13.71 ± 1.00	11.98 ± 0.72 ^c
Hematocrit (%)	39.79 ± 1.80 ^a	40.98 ± 2.78	36.94 ± 3.08 ^c
FVC (L/s)	2.46 ± 0.46 ^b	2.04 ± 0.61	1.79 ± 0.53
% predicted FVC	94.88 ± 7.45 ^{a b}	74.97 ± 15.44	68.35 ± 12.12
FEV ₁ (L/s)	2.05 ± 0.39 ^{a b}	1.01 ± 0.29	0.92 ± 0.35
% predicted FEV ₁	97.33 ± 8.15 ^{a b}	47.82 ± 14.01	46.65 ± 13.22
FEV ₁ /FVC	83.66 ± 2.56 ^{a b}	50.37 ± 7.71	52.28 ± 13.85

Data are presented as mean ± SD

Note; BMI = body mass index; FVC = forced vital capacity; FEV₁ = forced vital capacity in 1 second

a = significant between normal and non anemic group (p<0.05)

b = significant between normal and anemic group (p<0.05)

c = significant between anemic and non anemic group (p<0.05)

Table 2. Distance and physiological responses during 6MWT

Variables	Control group (n=17)	Pathologic group	
		Non anemic COPD (n=17)	Anemic COPD (n=17)
6MWD	470.35 ± 43.10 ^{ab}	390.12 ± 50.75	300.12 ± 88.55 ^c
Resting HR (beats/min)	73.76 ± 9.13 ^{a b}	83.47 ± 10.01	88.94 ± 9.20
HRim (beats/min)	101.00 ± 14.20	104.06 ± 9.42	110.35 ± 13.61
Resting SpO ₂ (%)	97.35 ± 0.99	96.35 ± 2.32	95.65 ± 2.57
SpO ₂ im (%)	96.65 ± 2.62 ^{ab}	90.06 ± 7.11	84.82 ± 6.69 ^c
Resting DBP (mmHg)	72.94 ± 5.88	71.76 ± 7.28	74.12 ± 7.95
DBPim (mmHg)	76.47 ± 8.62	72.94 ± 9.85	74.12 ± 8.70
Resting SBP (mmHg)	115.88 ± 13.25	115.88 ± 10.03	118.24 ± 12.86
SBPim (mmHg)	127.65 ± 10.33	129.41 ± 9.66	130.00 ± 10.00

Data are presented as mean ± SD

Note; HR = heart rate; HRim = heart rate immediately after the test; SpO₂ = oxygen saturation;

SpO₂im = oxygen saturation immediately after the test; DBP = Diastolic blood pressure; DBP im =

diastolic blood pressure immediately after the test; SBP = Systolic blood pressure; SBPim = Systolic

blood pressure immediately after the test

a = significant between normal and non anemic group (p<0.05)

b= significant between normal and anemic group (p<0.05)

c = significant between anemic and non anemic group (p<0.05)

Table 3. The leg fatigue and dyspnea sensation before and after 6MWT

Variables	Control group (n=17)	Pathologic group	
		Non anemic COPD (n=17)	Anemic COPD (n=17)
Fatigue (Borg scale)			
Resting fatigue	0	0.06 ± 0.24	0.18 ± 0.35
Fatigue im	0.35 ± 0.79	1.17 ± 1.01	1.76 ± 1.30
Change score	0.35 ± 0.79	1.12 ± 0.93	1.59 ± 1.26
Dyspnea (Borg scale)			
Resting dyspnea	0	0.80 ± 1.19	0.91 ± 1.09
Dyspnea im	2.41 ± 1.87	2.53 ± 1.59	3.29 ± 1.40
Change score	2.41 ± 1.87	1.74 ± 0.94	2.38 ± 1.05

Data are presented as mean ± SD

Note; Fatigue im = Fatigue sensation immediately after the test, Dyspnea im = Dyspnea sensation immediately after the test