Table (1): Demographic data of the studied population

Variable	Number (%)
Age (year) Mean ± SD Median (range)	 59.81±14.31 63 (17-88)
Gender Females Males	 23 (43.4%) 30 (56.6%)
Occupation House wife Farmer Worker other	 23 (43.4%) 10 (18.9%) 10 (18.9%) 10 (18.9%)
Smoking status Non-smoker Smoker Ex-smoker	 26 (49.1%) 13 (24.5%) 14 (26.4%)
Smoking index Mild Moderate Heavy	 1 (3.7%) 4 (14.8%) 22 (81.5%)
history of previous ICU admission Yes No	 11 (20.8%) 42 (79.2%)

ICU: Intensive care unit

Table (2): Relationship between weaning outcomes and demographic data

Variable	Simple weaning Number (%)	Difficult weaning Number (%)	Prolonged weaning Number (%)	P	P1	P2	P3
Age (year)	57.3±13.90	62.85±15.80	59±12.65	0.47	0.68	1.00	1.00
Gender Females Males	 6 (30%) 14 (70%)	 11 (55%) 9 (45%)	 6 (46.15%) 7 (53.85%)	0.27	0.11	0.35	0.62
Smoking status Non-smoker Smoker Ex-smoker	 7 (35%) 6 (30%) 7 (35%)	 12 (60%) 4 (20%) 4 (20%)	 7 (53.85%) 3 (23.85%) 3 (23.08%)	0.61	0.28	0.56	0.94
Smoking index Mild Moderate Heavy	 1 (7.69%) 3 (23.08%) 9 (69.23%)	 0 1 (12.5%) 7 (87.50%)	 0 0 6 (100%)	0.53	0.76	0.67	1.00
History of previous ICU Yes No	 2 (10%) 18 (90%)	 5 (25%) 15 (75%)	 4 (30.77%) 9 (69.23%)	0.3	0.41	0.18	1.00

Data are presented as mean ± SD (unless otherwise indicated)
P: compared the 3 groups P1: compared simple with difficult P2: compared simple with prolonged, P3: compared difficult with prolonged

Table (2) shows that there was no statistically significant relationship between 3 different groups of weaning outcomes (simple, difficult, prolonged weaning) and demographic data as regard of age (P= 0.47), gender (P= 0.27), smoking status and index (P= 0.61& 0.43 respectively) and history of previous admission of ICU (P= 0.3).

Table (3): Relationship between weaning outcomes and co-morbidities

Co-morbidities	Simple weaning Number (%)	Difficult weaning Number (%)	Prolonged weaning Number (%)	P	P1	P2	P3
Cardiac disease	4 (20%)	11 (55%)	7 (53.85%)	0.047	0.02	0.07	0.95
DM	6 (30%)	7 (35%)	7 (53.85%)	0.37	0.74	0.17	0.28

Hypertension	4 (20%)	9 (45%)	7 (53.85%)	0.1	0.09	0.07	0.62
Neurological disease	3 (15%)	5 (25%)	7 (53.85%)	0.19	0.18	0.28	1.00
Thyroid disease	2 (10%)	1 (5%)	0	0.47	1.00	0.51	1.00
Rheumatological disease	1 (5%)	1 (5%)	0	0.71	1.00	1.00	1.00
Renal disease	0	1 (5%)	0	0.43	1.00	1.00	1.00
No of co-morbidity None < 2co-morbidity ≥ 2co-morbidity	 5 (25%) 12 (60%) 3 (15%)	 3 (15%) 6 (30%) 11 (55%)	 0 3 (23.08%) 10 (76.92%)	 0.007	 0.03	 0.001	 0.26

P: compared the 3 groups P1: compared simple with difficult P2: compared simple with prolonged, P3: compared difficult with prolonged
DM: Diabetes mellitus

Table (3) shows that cardiac co-morbidities were significantly associated with difficult and prolonged weaning in comparison to patients with simple weaning (P= 0.047& 0.02 respectively).There was no statistically significant relationship between 3 different groups of weaning outcomes and other co-morbidities as regard DM (P= 0.37), hypertension (P= 0.1), neurological diseases (P= 0.19), thyroid diseases (P= 0.47), hepatic diseases (P= 0.18), rheumatological diseases (P= 0.71) and renal diseases (P= 0.43). Difficult and prolonged weaning was significantly higher in patients with≥ 2 co-morbidities weaning in comparison to patients with < 2co-morbidities or without co-morbidities (P= 0.007, 0.03 and 0.001 respectively).

Table (4): Relationship between weaning outcomes and the causes of respiratory failure

Variable	Simple weaning Number (%)	Difficult weaning Number (%)	Prolonged weaning Number (%)	P	P1	P2	P3
COPD	10 (65%)	9 (45%)	5 (38.5%)	0.26	0.20	0.14	0.71
Pneumonia	3 (15%)	10 (50%)	3 (23.1%)	0.04	0.02	0.56	0.12
IPF	1 (5%)	3 (15%)	2 (15.4%)	0.53	0.61	0.55	1.00
Overlap syndrome	1 (5%)	2 (10%)	2 (15.4%)	0.61	1.00	0.55	1.00
Bronchiectasis	2 (10%)	0	3 (23.1%)	0.09	0.45	0.36	0.052
OH syndrome	2 (10%)	0	0	0.61	1.00	1.00	0.55
Malignancy	2 (10%)	2 (10%)	1 (7.7%)	0.97	1.00	1.00	1.00
Kyphoscliosis	0	1 (5%)	0	0.43	1.00	1.00	1.00

P: compared the 3 groups P1: compared simple with difficult P2: compared simple with prolonged P3: compared difficult with prolongedCOPD:Chronic obstructive pulmonary diseaseIPF: Interstitial pulmonary fibrosisOH syndrome: Obesity hypoventilation syndrome

Table (4) shows the relationship between weaning outcomes and the cause of respiratory failure; Patients with pneumonia experienced difficult weaning in comparison to simple and prolonged weaning (P= 0.02). There was no statistically significant relationship between 3 different groups of weaning outcomes and other respiratory diseases as regard COPD (P= 0.26), IPF (P= 0.53), overlap syndrome (P= 0.61), bronchiectasis (P= 0.09), OH syndrome (P= 0.61), malignancy (P= 0.97) and kyphoscoliosis (P= 0.43).

Table (5): Relationship between weaning outcomes and laboratory investigation of the studied population

Variable	Simple weaning	Difficult weaning	Prolonged weaning	P	P1	P2	P3
WBCs (×103cells/mcL)	12.33±5.18	15.09±5.64	16.51±4.37	0.07	0.12	0.03	0.36
Hemoglobin(gm/dL)	13.09±2.51	10.61±2.47	11.02±1.53	0.003	0.004	0.04	1.00

ALT (IU/L)	39.35±30.41	58.75±87.74	20.77±10.03	0.003	0.38	0.007	0.001
AST (IU/L)	43.3±30.85	91.55±182.27	22.23±8.77	0.002	0.27	0.004	0.0009
Albumin (gm/lL)	2.87±0.67	2.64±0.61	2.37±0.75	0.25	0.56	0.1	0.25
Urea (mg/dL)	26.41±22.61	27.54±21.55	46.55±21.69	0.005	0.47	0.005	0.003
Serum Na+ (mmol/L)	138±4.91	139.15±6.07	140.46±6.70	0.5	1.00	0.72	1.00
Serum Mg++ (mg/dL)	2.15±0.36	2±0.4	1.43±0.47	<0.0001	0.99	<0.0001	0.001
Serum K+(mmol/L)	4.41±0.64	3.94±0.83	3.93±0.78	0.10	0.16	0.25	1.00
Serum Ca ++ (mg/dL)	8.62±0.57	8.34±0.99	6.93±1.49	0.0001	1.00	<0.0001	0.001

Data are presented as mean ± SD (unless otherwise indicated)
P: compared the 3 groups P1: compared simple with difficult P2: compared simple with prolonged P3: compared difficult with prolonged
WBCs: White blood cells PLTs: Platelets ALT: Alanine transaminase AST: Aspartate transaminaseNa+: Sodium Mg++: Magnesium K+: PotassiumCa++: Calcium

Table (5) shows that WBCs significantly higher in patients with prolonged weaning in comparison to patients with simple weaning (P= 0.03). Patients with low hemoglobin level were significantly experienced difficult and prolonged weaning in comparison to patients with simple weaning
(P= 0.004 & 0.04 respectively). There was statistically significant relationship between 3 different groups of weaning outcomes and high ALT and AST levels (P= 0.003) and also in comparison simple weaning with prolonged weaning (P= 0.007) and difficult weaning with prolonged weaning (P= 0.001). Patients with low albumin level were experienced difficult and prolonged weaning but statistically not significant (P= 0.25). Patients with elevated urea level were significantly experienced difficult and prolonged weaning in comparison to patients with simple weaning (P= 0.005& 0.004 respectively).
Patients with low serum Mg++ and serum Ca++ levels were significantly experienced difficult and prolonged weaning in comparison to patients with simple weaning.

Table (6): Relationship between weaning outcomes and baseline arterial blood gases parameters

Arterial blood gases	Simple weaning	Difficult weaning	Prolonged weaning	P	P1	P2	P3
PH	7.31±0.11	7.26±0.13	7.25±0.16	0.34	0.81	0.68	1.00
PaCo2 (mmHg)	68.25±18.99	70.25±25.40	63.92±34.80	0.74	0.87	0.47	0.52
PaO2 (mmHg)	54.±11.73	59.45±21.29	52.54±18.06	0.59	0.65	0.51	0.33
Sao2%	81.35±11.95	83.85±9.86	82.54±9.97	0.76	1.00	1.00	1.00
HCO3 (mEq/L)	33.33±6.61	28.12±9.53	27.28±6.44	0.05	0.12	0.11	1.00

Data are presented as mean ± SD (unless otherwise indicated)
P: compared the 3 groups P1: compared simple with difficultP2: compared simple with prolonged P3: compared difficult with prolonged
PaCO2: Partial arterial tension of carbon dioxide PaO2: Partial arterial tension of oxygen SaO2%: Oxygen saturation

Table (6) shows that there was no statistically significant relations between 3 different groups of weaning outcomes and baseline arterial blood gases as regard (PH, PaCO2, PaO2, SaO2%&HCO3).

Table (7): Relationship between weaning outcome and arterial blood gases parameters at the beginning of the first weaning trial

Arterial blood gases	Simple weaning	Difficult weaning	Prolonged weaning	P	P1	P2	P3
PH	7.44±0.05	7.42±0.06	7.42±0.11	0.66	1.00	1.00	1.00
PaCo2 (mmHg)	45.23±11.33	54.4±9.41	53.45±16.32	0.11	1.00	0.15	0.24
PaO2 (mmHg)	74.8±19.10	77.75±21.57	70.38±14.13	0.66	0.72	0.59	0.35
Sao2%	94.4±3.19	89.95±6.71	81.31±8.75	<0.0001	0.09	<0.0001	0.001
HCO3(mEq/L)	35.36±6.21	33.66±8.41	33.82±6.75	0.73	1.00	1.00	1.00
P/F	182.17±52.6	200.25±51.7	172.15±37.1	0.25	0.74	1.00	0.34
Shunt	12.36±3.54	10.99±2.36	11.78±1.67	0.3	0.37	1.00	1.00
(A-a) gradient	169.04±54.6	147.66±34.1	150.66±22.7	0.23	0.32	0.65	1.00

Data are presented as mean ± SD (unless otherwise indicated)
P: compared the 3 groups P1: compared simple with difficult
P2: compared simple with prolonged P3: compared difficult with prolonged
P/F: Partial arterial tension of oxygen/ friction inspiratory oxygen (A-a) gradient: Alveolar- arterial oxygen gradient

Table (7) shows the relationship between weaning outcome and arterial blood gases parameters at the beginning of the first weaning trial: the mean level of SaO2% was low in patients with prolonged and difficult weaning in comparison to patients with simple weaning (P= 0.0001& 0.001respectively). There was no statically significant relationship between 3 different groups of weaning outcomes and other arterial blood gases parameters as regard PH (P= 0.66), PaO2 (P= 0.66), PaCO2 (P= 0.11), HCO3 (P= 0.73), P/F (P= 0.25), shunt (P= 0.3) and [A-a] gradient (P= 0.23).

Table (8): Relationship between weaning outcome and ventilator parameters during first weaning trial

Ventilator parameters	Simple weaning	Difficult weaning	Prolonged weaning	P	P1	P2	P3
Tidal volume (mL)	465.5±39.93	448.5±55.18	448.46±39.13	0.44	0.75	0.92	1.00
Respiratory rate (cycle/min)	19.55±3.28	30.3±3.38	28.16±6.53	<0.0001	<0.0001	<0.0001	0.94
Mean blood pressure (mmHg)	85.8±9.42	88.48±17.38	87.17±5.86	0.79	1.0	1.00	1.00
SaO2%	94.3±2.89	94.9±4.24	93.3±3.63	0.47	1.00	1.00	0.67
Minute ventilation (mL/min)	9.12±1.57	13.35±3.62	11.84±2.73	<0.0001	<0.0001	0.03	0.40
RSBI	42.46±9.15	68.66±19.80	58.48±12.22	<0.0001	<0.0001	0.01	0.17

Data are presented as mean ± SD (unless otherwise indicated)
P: compared the 3 groups P1: compared simple with difficult
P2: compared simple with prolonged P3: compared difficult with prolonged
RSBI: Rapid shallow breathing index

Table (8) shows the relationship between weaning outcomes and ventilator parameters during first weaning trial: the mean value of respiratory rate, minute ventilation and RSBI were higher in patients with difficult and prolonged weaning in comparison to patients with simple weaning.

Table (9): Relationship between weaning outcome and duration of MV and ICU stay, complications and outcome of MV

Variable	Simple weaning	Difficult weaning	Prolonged weaning	P	P1	P2	P3
Duration of MV(day)	6.25±4.24	10.3±5.42	18.38±4.38	0.0001	0.005	0.0001	0.0003
Duration in ICU (day)	11.8±6.37	15.35±6.93	22.69±3.17	0.0002	0.09	0.0001	0.002
Death Yes No	 0 20 (100%)	 12(60%) 8 (40%)	 7 (53.85%) 6 (46.15%)	 <0.0001	 <0.0001	 <0.0001	 0.73

Data are presented as mean ± SD (unless otherwise indicated)

P: compared the 3 groups P1: compared simple with difficult P2: compared simple with prolonged P3: compared difficult with prolonged

MV: Mechanical ventilation ICU: Intensive care unit

Table (9) shows the duration of MV and ICU stay were significantly longer in patients with difficult and prolonged weaning in comparison to patients with simple weaning.Patients with difficult and prolonged weaning associated with poor outcome (death) in comparison to patients with simple weaning