Table (1): *Relationship between prolonged weaning and demographic data of the studied population*

Variable	Prolonged weaning	P value	
	No	Yes	
Age (year)	60.08±12.65	59±12.65	0.82
Gender Females Males	 17 (42.5%) 23 (57.5%)	 6 (46.15%) 7 (53.85%)	 0.82
Smoking status Non-smoker Smoker Ex-smoker	 19 (47.5%) 10 (25%) 11 (27.5%)	 7 (53.85%) 3 (23.85%) 3 (23.1%)	 0.92
Smoking index Mild Moderate Heavy	 1 (9.09%) 4 (36.36%) 16 (100%)	 0 0 6 (54.55%)	 0.15
History of previous ICU admission No Yes	 33 (82.5%) 7 (17.5%)	 9 (69.23%) 4 (30.77%)	 0.43

Data are presented as mean ± SD (unless otherwise indicated)ICU: Intensive care unit

Table (1) shows that there was no statistically significant relationship between prolonged weaning and demographic data as regard age (P= 0.82), gender (P= 0.82), smoking (status & index) (P= 0.92& 0.15 respectively) and history of previous ICU admission (P= 0.43).

Table (2): *Relationship between prolonged weaning and co-morbidities*

Co-morbidities	Prolonged weaning		P value
	No	Yes	
Cardiac disease	**15 (37.5%)**	**7 (53.85%)**	**0.3**
DM	**13 (32.5%)**	**7 (53.85%)**	**0.2**
Hypertension	**13 (32.5%)**	**7 (53.85%)**	**0.2**
Neurological disease	**7 (17.5%)**	**5 (38.48%)**	**0.67**
Thyroid disease	**3 (7.5%)**	**0**	**0.57**
Hepatic disease	**2 (5%)**	**0**	**1.00**
Rheumatological disease	**2 (5%)**	**0**	**1.00**
Renal disease	**1 (2.5%)**	**0**	**1.00**

DM: Diabetes mellitus

Table (2) shows that there was no statistically significant relationship between prolonged weaning and co-morbidities.

Table (3): *Relationship between prolonged weaning and the causes of respiratory failure*

Cause of respiratory failure	Prolonged weaning		P value
	No	Yes	
COPD	**17 (61.54%)**	**5 (38.46%)**	**0.3**
Pneumonia	**13 (32.5%)**	**3 (23.08%)**	**0.52**
IPF	**4 (10%)**	**2 (15.38%)**	**0.63**
Overlap syndrome	**3 (7.5%)**	**2 (15.38%)**	**0.59**
Bronchiectasis	**2 (5%)**	**3 (23.08%)**	**0.09**
OH syndrome	**2 (5%)**	**0**	**0.59**
Malignancy	**4 (10%)**	**1 (7.69%)**	**1.00**
Kyphoscoliosis	**1 (2.5%)**	**0**	**1.00**

COPD:Chronic obstructive pulmonary disease IPF:Interstitial pulmonary fibrosis OH syndrome: Obesity hypoventilation syndrome

Table (3) shows that there was no statistically significant relationship between prolonged weaning and the cause of respiratory failure as regard COPD (P= 0.3), pneumonia (P= 0.52), IPF (P= 0.63), overlap syndrome (P= 0.59), bronchiectasis (P= 0.09), OH syndrome (P= 0.59), malignancy (P= 1.00) and kyphoscoliosis (P= 1.00).

Table (4): *Relationship between prolonged weaning and laboratory investigation*

Variable	Prolonged weaning		P value
	No	Yes	
WBCs (/L)	13.7±5.52	16.51±4.37	0.08
Haemoglobin (gm/dL)	11.85±2.76	11.02±1.53	0.31
PLTs(/L)	231.45±94.61	210.31±72.62	0.48
ALT (IU/L)	49.05±65.56	20.77±10.03	0.0001
AST (IU/L)	67.43±131.33	22.23±8.77	0.0005
Creatinine (mg/dL)	1.28±1.35	1.06±0.36	0.54
Albumin (gm/L)	2.76±0.64	2.37±0.75	0.12
Urea (mg/dL)	26.98±21.81	46.55±21.69	0.001
Serum Na + (mmol/L)	138.58±5.48	140.46±6.70	0.38
Serum Mg++(mg /dL)	2.06±0.38	1.43±0.47	<0.0001
Serum K+(mmol/L)	4.18±0.76	3.93±0.78	0.33
Serum Ca ++(mg /dL)	8.48±0.81	6.93±1.49	<0.0001

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

WBCs: White blood cellsPLTs: Platelets ALT: Alanine transaminaseAST: Aspartate transaminase Na+: Sodium Mg++:Magnesium K+: Potassium Ca++: Calcium

Table (4) shows that there was statistically significant relationship between prolonged weaning and ALT (P= 0.0001), AST (P= 0.0005), elevated urea level (P= 0.001), low serum Mg++ level (P < 0.0001) and low serum Ca++level (P < 0.0001). Patients with low serum albumin level were experienced prolonged weaning but statically not significant (P= 0.12).

Table (5): *Relationship between prolonged weaning and arterial blood gases parameters at the beginning of the first weaning trial*

Arterial blood gases	Prolonged weaning		P value
	No	Yes	
PH	7.43±0.06	7.42±0.11	0.73
PaCO2 (mmHg)	45.23±11.33	53.93±13.16	0.04
PaO2 (mmHg)	76.28±20.16	70.38±14.13	0.41
SaO2%	92.18±5.65	81.31±8.75	<0.0001
HCO3(mEq/l)	34.51±7.35	33.82±6.75	0.76
P/F	191.21±52.25	172.15±37.1	0.23
Shunt (%)	11.67±3.05	11.78±1.67	0.91
(A-a) O2gradient (mmHg)	158.34±46.22	150.66±22.7	0.57

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

PaCO2: Partial arterial tension of carbon dioxide PaO2: Partial arterial tension of oxygen SaO2%: Oxygen saturation

Table (5) shows the relationship between prolonged weaning and arterial blood gases parameters at the beginning of the first weaning trial: the mean level of PaCO2 was significantly higher in patients with prolonged weaning in comparison to other weaning outcomes (P= 0.04).The mean level of SaO2% was significantly low in patients with prolonged weaning in comparison to other weaning outcomes (P: <0.0001).

Table (6): *Relationship between prolonged weaning and change of arterial blood gases between the beginning and the end of weaning trial*

Blood gases parameters	Prolonged weaning		P value
	No	Yes	
PH change	0.14±0.12	0.17±0.13	0.44
PaCO2 change	[-15.33] ± 22.73	[-18.69] ± 27.3	1.00
PaO2 change	19.5±28.70	17.85±21.49	0.99
SaO2% change	9.58±13.34	[-1.23] ± 9.64	0.006
HCO3-	3.79±6.07	6.53±5.97	0.18

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

Table (6)showsthe relationship between prolonged weaning and change of arterial blood gases between the beginning and the end of weaning trial; there was a significant relationship between prolonged weaning and deterioration of SaO2% in the form of decrease of mean level of SaO2% (P= 0.006).

Table (7): Relationship between prolonged weaning and duration of MV&ICU stay, complications and outcomes

Variable	Prolonged weaning		P value
	No	Yes	
Duration of MV(day)	8.28±5.22	18.38±4.38	0.0001
Duration in ICU(day)	13.58±6.81	22.69±3.17	0.0001
Complications			
No	33 (82.5%)	11 (84.62%)	
VAP	2 (5%)	2 (15.38%)	
CVS	1 (2.5%)	0	0.81
HAP	1 (2.5%)	0	
Hematemesis	1 (2.5%)	0	
Shock	1 (2.5%)	0	
Tracheoesophageal fistula	1 (2.5%)	0	
Death			
Yes	12 (30%)	7 (53.85%)	
No	28 (70%)	6 (46.15%0	0.18

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

MV: Mechanical ventilation ICU: Intensive care unit VAP: Ventilator associated pneumonia HAP: Hospital associated pneumonia CVS: Cerebrovascular stroke

Table (7) shows that the duration of MV and ICU stay were significantly longer in patients with prolonged weaning than other weaning outcomes (P= 0.0001 for both).

Table (8): *Multivariate analysis of factors predicting prolonged weaning*

Variable	Odds ratio (95% confidence interval)	P value
Two or more co-morbidity compared to none or one	5.21 (0.29-93.69)	0.26
WBCs ($\times 10^3$cells/mcL)	1.05 (0.77-1.45)	0.73
ALT (IU/L)	0.91 (0.81-1.03)	0.13
AST (IU/L)	0.86 (0.72-1.02)	0.1
Mg++ (mg/dL)	0.04 (0.004-0.47)	0.01
Ca++ (mg/dL)	0.32 (0.08-1.19)	0.09
Tidal volume (baseline)	1.02 (0.98-1.06)	0.35
PaCO2 (first weaning trial)	1.01 (0.90-1.14)	0.8
SaO2% (first weaning trial)	1.03 (0.67-1.57)	0.89
SaO2% change	0.68 (0.54-1.04)	0.03
Urea (mg/dL)	0.99 (0.96-1.04)	0.91
Albumin (gm/L)	0.37 (0.04-3.44)	0.38
ICU stay (day)	1.09 (0.71-1.69)	0.68
MV duration (day)	1.32 (0.79-2.21)	0.28
RSBI	1.10 (0.85-1.42)	0.46
Minute ventilation (L/min)	0.67 (0.20-2.21)	0.73

Table (8) shows; the multivariate analysis demonstrates that serum Mg++ level (P= 0.03) and SaO2% changebetween the beginning and the end of weaning trial (P= 0.02) were a significant predictors of prolonged weaning.

Table (9): *Optimum diagnostic cut off value, AUC (parentheses 95% CI), sensitivity, specificity, and positive (PPV) and negative predictive values (percentages) of ventilator and blood gases parameters at baseline for predicting prolonged weaning*

Variable	Cutoff	AUC (95% CI)	Sensitivity	Specificity	PPV	NPV	Accuracy	P value
Serum Mg++(mg/dL)	≤1.5	0.83 (0.70-0.92)	61.5	92.5	72.7	88.1	77.00	<0.0001
Tidal volume(mL)	≤450	0.69 (0.55-0.81)	76.9	55.0	35.7	88	65.95	0.02
PH	≤7.1	0.57 (0.42-0.70)	30.8	95.0	66.7	80.9	62.90	0.54
PaCO2(mmHg)	≥52	0.57 (0.43-0.71)	61.5	75.0	44.4	85.7	68.25	0.55
PaO2(mmHg)	≤40	0.59 (0.44-0.72)	38.5	87.5	50.0	81.4	63.00	0.41
SaO2%	≤78	0.51 (0.37-0.65)	38.5	75.0	33.3	78.9	56.75	0.93
HCO3(mEq/L)	≤31	0.64 (0.49-0.76)	84.6	45.0	33.3	90.0	64.80	0.09

Table (9) showsthatoptimum diagnostic cut off value of baseline serum Mg++ level (≤1.5mg/dL) was statically significant for predicting prolonged weaning (P < 0.0001). Optimum diagnostic cut off value of baseline tidal volume (≤450 mL) was statically significant for predicting prolonged weaning (P <0.02).

Table (10): *Optimum diagnostic cut off value, AUC (parentheses 95% CI), sensitivity, specificity, and positive (PPV) and negative predictive values (percentages) of ventilator and blood gases parameters at the beginning of the first weaning trial for predicting prolonged weaning*

Variable	Cutoff	AUC (95% CI)	Sensitivity	Specificity	PPV	NPV	Accuracy	P value
Tidal volume(mL)	≤480	0.61 (0.47-0.75)	69.2	52.5	32.1	0.84	60.85	0.18
Respiratory rate(cycle/min)	>19	0.64 (0.49-0.77)	69.2	67.5	40.9	87.1	68.35	0.1
PH	>7.44	0.53 (0.39-0.67)	46.5	72.5	35.3	80.6	59.50	0.79
PaCO2(mmHg)	≥49	0.69 (0.55-0.81)	69.2	62.5	37.5	86.2	65.85	0.02
PaO2(mmHg)	≤94	0.58 (0.43-0.71)	100	17.5	28.3	100	58.75	0.39
SaO2%	≤91	0.88 (0.77-0.96)	100	60	44.8	100	80.00	<0.0001
HCO3(mEq/L)	≤31	0.52 (0.38-0.66)	46.2	70.0	33.3	80.0	58.10	0.86
P/F	≤151	0.62 (0.47-0.75)	38.5	85.0	45.5	81.0	61.75	0.19
Shunt	>10.3	0.59 (0.45-0.72)	92.3	37.5	32.4	93.7	64.90	0.27
(A-a) gradient	>136	0.51 (0.37-0.65)	92.3	40	33.3	94.1	66.15	0.87

Table (10) *shows that optimum diagnostic cut off value of PaCO2 at first weaning trial (≥49mmHg) was statically significant for predicting prolonged weaning (P <0.02). Optimum diagnostic cut off value of SaO2% at first weaning trial (≤91%) was statically significant for predicting prolonged weaning (P <0.0001).*

Table (11): *Optimum diagnostic cut off value, AUC (parentheses 95% CI), sensitivity, specificity, and positive (PPV) and negative predictive values (percentages) of changes in ventilator and blood gases parameters between the beginning and the end of weaning trial for predicting prolonged weaning*

Variable	Cutoff	AUC (95% CI)	Sensitivity	Specificity	PPV	NPV	Accuracy	P value
PH change	**>0.23**	**0.57 (0.43-0.71)**	**38.5**	**85**	**45.5**	**81.0**	**61.75**	**0.48**
PaCO2 change	**>[-46]**	**0.50 (0.36-0.64)**	**69.2**	**10.0**	**20**	**50**	**39.60**	**1.00**
PaO2 change	**≤42**	**0.50 (0.36-0.64)**	**100**	**20**	**28.9**	**100**	**60.00**	**0.99**
SaO2% change	**≥5**	**0.76 (0.62-0.86)**	**84.6**	**65.0**	**44.0**	**92.9**	**74.80**	**0.003**
HCO3 change	**>6**	**0.62 (0.48-0.75)**	**61.5**	**67.5**	**38.1**	**84.4**	**64.50**	**0.19**

Table (11) shows that optimum diagnostic cut off value of SaO2% change in the form of decrease between baseline and first weaning trial (≤5) was statically significant for predicting prolonged weaning ($P < 0.003$).