COVID-19 in Egypt(Third wave)

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Abstract: -
Background: *In this work we aimed to evaluate and assessment the ability of complete blood cells, coagulation and biochemical tests of interleukin-6, 8, and If- γ in patients with COVID-19 in Egypt(Third wave) and examination of the CT medical imaging findings.* ***Methods:*** *The total number of 50 patients (30 females,20 malesand 10 control group). We measured complete blood cells, coagulation andbiochemical tests of interleukin-6, 8, and If- γ in patients with COVID-19 in Egypt(Third wave) and examination of the CT medical imaging findings.* ***Results:*** *Patients with COVID-19 had significantly increased white blood cell (WBC) count, neutrophils and lymphocyte compared with control group. Biomarkers of inflammation,liver and kidney functionand coagulation measures were also significantlyincreased in patients COVID-19in Egypt(Third wave). In patients with COVID-19 expression of both IL-6 and IL-8 increased with highly inflammatory activity.IL-6,IL-8 and IF-γ were significantly highest in patients with COVID-19 with no significant difference between them females and males.*
Conclusions: *In patientsCOVID-19in Egypt(Third wave) very sick, and the virus highly spreading between families or friends, we recommend WBC count, Neutrophil count, lymphocyte count, and IL-6, IL-8, IF-γ ,serum ferritin and CRP as markers for highly potential progressionto critical illness.*
Keywords: COVID-19,CRP, WBC count, Interleukins,CT.

I.   Introduction: -

The COVID-19 pandemic in Egypt is part of the worldwide pandemic of (COVID-19) caused bysevere acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The virus was confirmed to have reached Egypt on 14 February 2020.
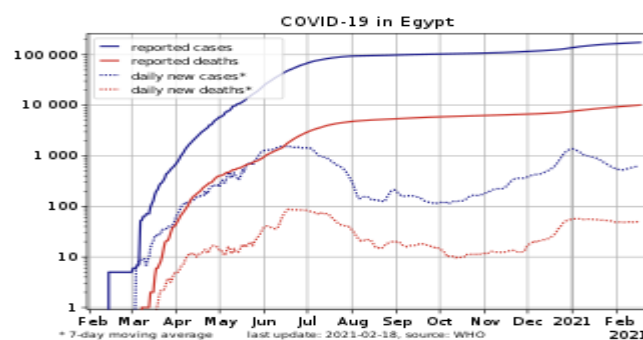

Fig.1: Chart showing the number of COVID-19 ("Corona") cases and deaths in Egypt. Logarithmic Scale. For related charts and data sources see User:Hbf878#COVID-19.

The family Coronavirus(COVID-19) disease constantly circulatein the human population and usually cause respiratorydisease around the world (Corman*et al.,* 2019).In December 2019, Wuhanarea is very dangerous because a new infectious respiratory diseasein Wuhan, Hubei province, China.(Huang *et al.,*2019 andWang*et al.,* 2020).The respiratory system especially lung injury caused by the COVID-19 infection in the form of acute respiratory distress has been seen in about 30% of cases(Huang*et al.,*2019).Chest computed tomography (CT) plays an important and necessary role in the evaluation and assessment of COVID-19, sometimes before the clinical symptoms and sign become apparent.(Pan *et al.,*2020)There is highly evidence of the prognostic value of chest CT which has been shown by recent studies, where a specific score by CT scan

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could predict the mortality of patients with COVID-19 .(Yuan *et al.,*2020) Any changes in the lung features on CT follow up have been mentioned in some previous studies (Pan *et al.,*2020 and Wei *et al.,*2019).

A new coronavirus(SARS-CoV) was appearing and determine as the causative pathogen (Ksiazek*et al.,*2003).(IL-6) is synthesized by a variety of cells in the lung parenchyma, including alveolar macrophages, type II pneumocytes, T lymphocytes, and lung fibroblasts. IL- 6 is important in regulating immunological and inflammatory responses (Chen *et al.,* 2001; Tanaka *et al.,* 2014). IL- 6 being an acute phase inflammatory cytokine suggests that measuring circulating IL- 6 maybeinvolved the inflammatory state of the lungs (Chen *et al.,* 2001; de Brito *et al.,* 2016).

C-reactive protein (CRP) is very important in medical imaging, C-reactive protein (CRP) isserum inflammatory marker studied in numerous infections (e.g. malaria, influenza ,HCV and HBV) (Vasileva&Badawi2019, AddaiMensah*et al.,*2019).Increased CRP has been associated with (increased risk of cancer ,cancer progression and with reduced survival in cancer patients)(Siemes*et al.,*2006), (Hall *et al.,*2013, Weber *et al.,*2019), (Allin*et al.,*2011, Weber *et al.,*2019, Iivanainen*et al.,*2019).

Aim of the work: -
This work is to find and quantitative descriptionhematologic,coagulation & inflammatory, biochemical studies of (IL-6, IL-8&IF-γ)and finding the CT medical imagingin patients with COVID-19 in Egypt(Third wave).

II. Materials And Methods: -

1-Patients COVID-19: -
A total of 50 COVID-19 patients (≥18 years old) were enrolled from October 6 university Hospital, Giza, Egypt.On the other hand, the study protocol was approved by the local ethics committee of October 6 university Hospital, Egypt. The patients were divided into three main groups; group includes 30 females (50%) COVID-19 patients. The other group was submitted to 20 males (33.3%) COVID-19 patient and 10 control group (16.6%).

2- Data collection: -
Serum samples were obtained by force centrifugation at (2000 rpm for 10 minutes). Serum samples were divided into two aliquots one for biochemical analysis and cytokines. Routine laboratory investigations (Liver function tests as (Albumin, Alanine, aminotransferase (ALT), Aspartate, aminotransferase (AST), Total bilirubinand Kidney function tests as (urea and creatinine) were measured using ALCYON 3000 i analyzer, Abbott laboratories, Spinreact kits (Ctra, Santa Coloma, Espana) (Bergmeyer*et al.,* 1978).Coagulation (Prothrombin time, D-dimer, Troponin). Hematologic (WBC count,Neutrophil count,Lymphocyte count,Hemoglobin). Inflammatory biomarkers (Erythrocyte sedimentation rate (ESR), C reactive protein (CRP), Serum ferritin.The detailed information on medical history, signs and symptoms. The chest computed tomography (CT) scans on admission were recorded.

3-Cytokines determination: -
(Beyaert*etal.,*1998) the cytokines (IL-6, IL-8&IF-γ)were determined by using ELISA kit and ELISA reader.This assay belongs to the quantitative description immunoassay technique. Polyclonal antibody specific for (IL-6, IL-8&IF-γ)have been pre-coated onto a micro plate. Standards and samples were pipette into the wells and any interleukins (IL-6, IL-8&IF-γ)present were pounded by the immobilized antibody. After washing the entire step any unbounded substances, an enzyme-linked polyclonal antibody specific for interleukins (IL-6, IL-8&IF-γ)were added to wells. The wash stepsis very important a to remove any unbounded antibody-enzyme reagent, a substrate solution was added to the wells and color changes in proportion to the amount of interleukins (IL-6, IL-8&IF-γ)bound in the initial step. The color was stopped by stopping solution and the intensity of the color was measured.

4-Imaging technique:-
50 patients with suspected covid-19 disease were examined using a multislice CT imaging modality (GE Bright speed 8 detector). Before scanning all patients wore surgical masks during imaging. The scan parameters were set as follows: tube voltage 120 (kV), tube current 300 (mA), slice interval 10 (mm), Beam Coll. (Det. Con) 8 x 2.5, Pitch1:1.675, FOV 350-400 (mm). The 1.25(mm) or 2.5 (mm) thick images were reconstructed using a highly frequency reconstruction algorithm. Acquisition slices thickness 10 (mm), scanning duration9.07 (s), standard lung window level 1600 (HU) and window width 600 (HU). The mediastina window levelabout the 350 (HU) and the window width about the 50 (HU). Patients was rested in supine comfortable position and held on their breath. The scanning area was specified to start at the lung apex and end at the posterior costophrenic angle. By the end of the scanning protocol the patient's personal protective supplies was removed and a disinfection protocol were applied for the equipment's, examination room and

personal and the images was evaluated to ensure that the examination was successful, and the image quality was sufficient for diagnosis.In CT scanners attenuation according to equation 1 and 2 is measured along a variety of lines within a plane perpendicular to the long x-axis of the patient with the goal of reconstructing a map of the attenuation coefficients *a* for this plane. The attenuation of monochromatic x-rays inhomogeneous objects is governed by

$$I = I_o \, e^{-\alpha x} \qquad \text{eq (1)}$$

where *I* is the x-ray intensity, I_0 is the x-ray intensity without the object, *x* is the length of the x-ray and *a* is the linear attenuation coefficient of the material for the x-ray highly energy .The attenuation of x-rays consequently can be described by

$$I = I_o \, e^{-\int \alpha(x)dx} \qquad \text{eq (2)}$$

III. Statistical Methods:-

(SPSS) is the statistical Package of Social Sciences. The data analyzed through the(SPSS). According to the research questions, Descriptive statistical techniques (Mean, Standard Deviation) and inferential (Independent sample t-test, one-way ANOVA) statistical techniques were applied.The experimental results in different groups are presented as mean ± standard deviation (M + SD).

Experimental Results:-
1-Baseline Characteristics of the COVID-19 PatientsIn Egypt (Third wave): -
The common signs and symptoms were loss of smell or taste (77.26%),fever (90.23%), cough (55.2%), shortness of breath (56.33%), headache (88.23%), fatigue (41.32%), vomiting (9.23%),abdominal pain (8.54%), chest pain (9.55%) and diarrhea (4.23%)

2-Effects of COVID-19 PatientsIn Egypt (Third wave)onHematologic: -
Table 1 showed themean and standard deviation white blood cell count, and neutrophil counts (11.9+ 0.02, 12.8+ 0.09, 11.46 + 1.06, 12. 66 + 1.44) females and males respectively. Significant increased numbers of white blood cells and neutrophil counts($P < 0.005$ and $P < 0.005$) females and malesrespectively.Table 1 shows the mean and standard deviation lymphocyte counts (8.000+ 7.5,9.000+ 8.5) females and males respectively .Significant increase numbers of lymphocyte ($P < 0.002$ and $P < 0.005$). Table 1 showed themean and standard deviation hemoglobin(7.9 + 0.525,7.8 + 0.811) females and males respectively .Significant decreased of hemoglobin($P < 0.001$ and $P < 0.005$).There were almost no differencewhite blood cell count, neutrophil counts,lymphocyte and hemoglobinbetween the two groups in females and males.

Table (1): HematologicFindings of COVID-19 PatientsinEgypt (Third wave)

Parameters \ Groups	WBC $\times 10^9$/L	Neutrophil count $\times 10^9$	Lymphocyte count $\times 10^9$/ μl	Hemoglobin (12 -16 g/L)
Control group (GI) (mean + SD)	4.9+ 0.02	822+ 0.021	4.000+ 0.22	13+ 1.11
Females group (GII) (mean + SD)	11.9+ 0.02	11.46+ 1.06	8.000+ 7.5	7.9 + 0.525
T-Test	P < 0.005	P < 0.005	P < 0.002	P < 0.001
Males group (GIII) (mean + SD)	12.8+ 0.09	12. 66+ 1.44	9.000+ 8.5	7.8 + 0.811
T-Test	P < 0.005	P < 0.005	P < 0.005	P < 0.005

(WBC), white blood cell.The different statistical parameters including (Mean + SD) with COVID-19.C=ControlF=female, M=male, SD=Standard Deviation: p value for Student t-test for comparing between the two studied group. Statistically significant at p ≤ 0.05

3-Effects of COVID-19 PatientsIn Egypt (Third wave)onLiver function tests & Kidney function tests:-
Table 2 showed themean and standard deviation (ALT) (U/l), (AST), (U/l),urea (mg%) and creatinine(mg%)(72.9±14.13,76.5±6.10,89.95±8.90,77.55±6.40,77.55±8.97, 73.9±2.75, 5.27±0.93, 5.29±1.26) females and males respectively. Significant increased (ALT) (U/l), (AST), (U/l),($P < 0.005$ and $P < 0.005$) females and males respectively. The data highly significant increased urea (mg%)($P < 0.0001$and $P < 0.0001$)and creatinine(mg%)($P < 0.0001$ and $P < 0.0001$) females and males respectively.Table 2 showed the

mean and standard deviationalbumin (g/dl) (2.99±0.32,2.98±0.32) females and males respectively. Significant decreased albumin (g/dl),(P < 0.001and P < 0.001). In this results no differences between two groups in females and males in(ALT),(AST),urea,creatinineand albumin.

Table (2): Liver function tests & Kidney function tests Findings of COVID-19 Patientsin Egypt (Third wave)

Parameters / Groups	(ALT) (U/l)	(AST) (U/l)	Albumin (g/dl)	Urea (mg%)	Creatinine (mg%)
C group (GI) (mean + SD)	18.7±4.40	19.35±4.27	4.18±0.48	39.5±6.79	0.50±0.26
F group (GII) (mean + SD)	72.9±14.13	89.95±8.90	2.99±0.32	77.5±8.97	5.27±0.93
T-Test	P < 0.005	P < 0.005	P < 0.001	P < 0.0001	P < 0.0001
M group (GIII) (mean + SD)	76.5±6.10	77.55±6.40	2.98±0.32	73.9±2.75	5.29±1.26
T-Test	P < 0.005	P < 0.005	P < 0.001	P < 0.0001	P < 0.0001

(ALT)Alanine aminotransferase, (AST).Glutamic-Oxaloacetic Transaminase .The different statistical parameters including (Mean + SD) with COVID-19.C=ControlF=female, M=male, S.D=Standard Deviation p value for Student t-test for comparing between the two studied group. Statistically significant at p ≤ 0.05.

4-Effects of COVID-19 PatientsIn Egypt (Third wave)onCoagulation &Inflammatory testes: -
Table 3 showed themean and standard deviation (D-dimer (<200 (ng/ml)),Troponin (<0.03) (ng/ml), ESR0-15 (mm/h), CRP(0-0.5 mg/dl),ferritin (21.81-274.66 (ng/ml)), andPCT ≥0.05 (nmol/l) (150.04 ± 99.9,180.04 ± 89.7,0.047 ±0.17, 0.050± 0.19,88 ± 1.1,89 ±1.2,123.6 ± 244.06, 129.9 ± 250.17, 413.05 ± 254.6, 420.12 ± 259.9, 7 ± 0.11, 6± 0.10)females and malesrespectively. The data are significant increased (D-dimer (<200 (ng/ml)),In this results no difference between the two groups in females(P < 0.001and P < 0.001 , P < 0.001and P < 0.001, P < 0.005and P < 0.005,P < 0.005P < 0.005, P < 0.001P < 0.001and P < 0.001P < 0.001) females and malesrespectively.

Table (3): Coagulation &Inflammatory biomarkers testsfindings of COVID-19 patients in Egypt (Third wave)

Parameters / Groups	Coagulation		Inflammatory biomarkers tests			
	D-dimer (<200) (ng/ml)	Troponin (<0.03)(ng/ml)	ESR 0-15 (mm/h)	CRP 0-0.5 (mg/dL)	Ferritin 21.81-274.66 (ng/ml)	PCT ≥0.05 (nmol/L)
C group (GI) (mean + SD)	0.00	0.01 ± 0.0	4 ± 0.0	0.2 ± 0.2	104 ± 1.02	0.01 ± 0.02
F group (GII) (mean + SD)	150.04 ± 99.9	0.047 ± 0.17	88 ± 1.1	123.6 ± 244.06	413.05 ± 254.6	7 ± 0.11
T-Test	P < 0.001	P < 0.001	P < 0.005	P < 0.005	P < 0.001	P < 0.001
M group (GIII) (mean + SD)	180.04 ± 89.7	0.050 ± 0.19	89 ± 1.2	129.9 ± 250.17	420.12 ± 259.9	6 ± 0.10
T-Test	P < 0.001	P < 0.001	P < 0.005	P < 0.005	P < 0.001	P < 0.001

(ESR), Erythrocyte sedimentation rate.(CRP), C-reactive protein.(PCT)procalcitonin.The different statistical parameters including (Mean + SD) with COVID-19.C=ControlF=female, M=male, S.D=Standard Deviation. p value for Student t-test for comparing between the two studied group. Statistically significant at p ≤ 0.05.

5-Effects of COVID-19PatientsIn Egypt (Third wave) on serum cytokine levels: -
Table 4showed the mean and standard deviation (Serum IL-6level (Pg/ml), Serum IL-8 level (Pg/ml) and Serum IF-γ level (Pg/ml)),(6.99±1.66, 6.98±1.85, 103.35±8.66, 130.34±8.58, 36.01±5.55, 49.17±6.47)respectively. Significant increased Serum IL-6 level (Pg/ml), Serum IL-8 level (Pg/ml) and Serum IF-γ level (Pg/ml),(P <0.001 and P < 0.001, P <0.001and P < 0.001 P < 0.001,P < 0.001and P < 0.001) females and malesrespectively.In this results no difference between the two groups in females and males(Serum IL-6 level (Pg/ml), Serum IL-8 level (Pg/ml) and Serum IF-γ level (Pg/ml)).

Table (4):IL-6levels, IL-8 levels and IF-γlevelstests findings of COVID-19 patients

Parameters Groups	Serum IL-6 level (Pg/ml)	Serum IL-8 level (Pg/ml)	Serum IF-γ level (Pg/ml)
C group (GI) (mean + SD)	**3.99±0.97**	**35.66±4.33**	**50.9±6.99**
F group (GII) (mean + SD)	**6.99±1.66**	**103.35±8.66**	**36.01±5.55**
T-Test	**P < 0.001**	**P < 0.001**	**P < 0.001**
M group (GIII) (mean + SD)	**6.98±1.85**	**130.34±8.58**	**49.17±6.47**
T-Test	**P < 0.001**	**P < 0.001**	**P < 0.001**

(IL), interleukin;(IF), Interferon-γThe different statistical parameters including (Mean + SD) with COVID-19.C=ControlF=female, M=male, S.D=Standard Deviation. p value for Student t-test for comparing between the two studied group. Statistically significant at p ≤ 0.05.

5- Imaging findings: -
50 patients with suspected COVID-19in Egypt(Third wave), showed signs of COVID-19 pneumonia on chest imaging during diagnosis. Fifteen (37.5%) patients were classified as early stage (Figs. 2). These cases frequently showed peripheral subpleural ground glass opacities (GGO). Twenty-one (52.5%) patients were classified into mild to moderate stage (Figs. 3 and 4). Four (10%) patients were classified into aggressive stage (Figs. 5), these patients commonly exhibited lesions in multiple lung segments and lobes, these patients commonly exhibited lesions in multiple lung segments and lobes with an increasing in ground-glass opacity density accompanied by consolidation and grid-like or cord-like shadows.
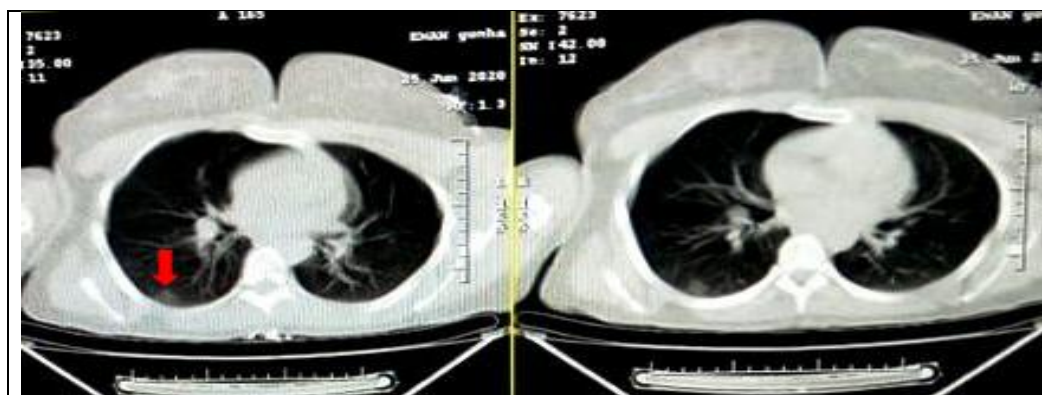

Fig.2. 25 year's old female has no notable signs but was in direct contact with infected patient with COVID-19, images (A&B) axial chest CT image showed small patchy ground-glass opacities (arrow) located along vascular bundles in the subpleural region.
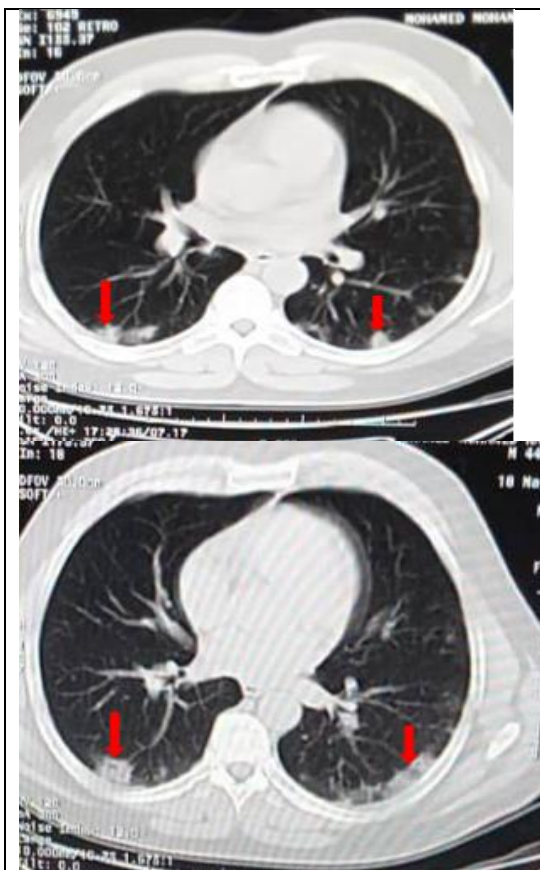
Fig.3. 44 years old malewho has experienced cough, chest pain and mild fever for 3 days; image (A, B) Plain axial CT images (chest window) showed multiple bilateral subpleural ground glass opacities (GGO) (arrows).
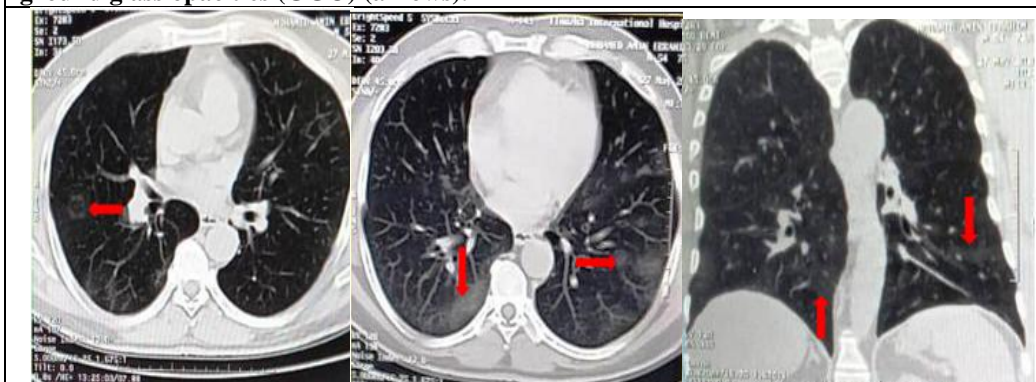

Fig.4. 54 years old male who reported fever, fatigue, and poor appetite for 5 days; image (A, B) Plain axial CT images (chest window) showed multiple bilateral subpleural ground glass opacities (GGO) (arrows), image (C) CT chest reconstructed image for the same patient with also multiple bilateral subpleural ground glass opacities (GGO) (arrows).
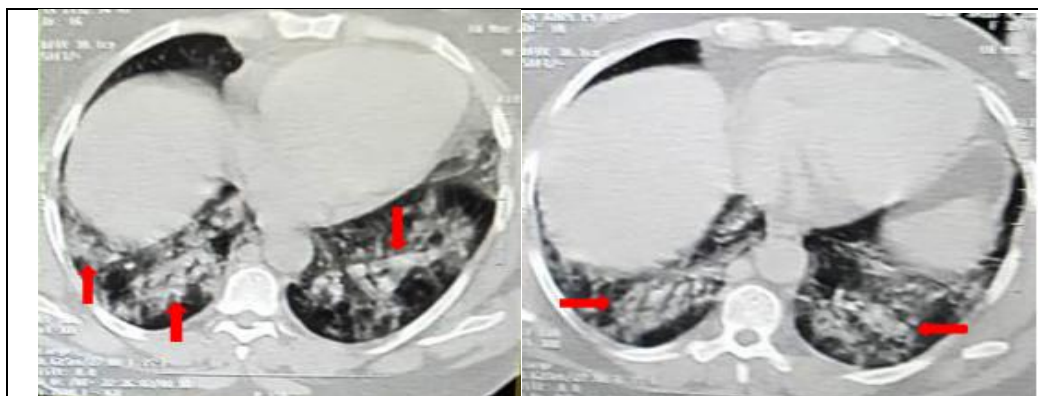
Fig.5. 35 years old female who has experienced cough, chest pain and sever fever for 7 days; (A&B) axial chest CT images showed bilateral lower lung interstitial thickening with multiple bilateral subpleural ground glass opacities (GGO) (arrows).

6-COVID-19PatientsIn Egypt (Third wave)Findings: -

1.   The main manifestations include common signs and symptoms were loss of smell or taste, fever, cough, shortness of breath, headache, fatigue, vomiting, abdominal pain, chest pain and diarrhea.

2.   In the early stages of the disease, peripheral WBC count is normal or increased and the lymphocyte count is increased.

3.   Some patients have increased all testes (liver enzymes,troponin, C-reactive protein and erythrocyte sedimentation rate and procalcitonin). In severe cases, D-dimer increases progressively decrease. Severe and critically ill patients often have increased inflammatory factors.

4.   In the early stage, imaging shows multiple small patchy shadows and interstitial changes, more apparent in the peripheral zone of lungs. As the disease progresses, imaging shows.

5.   CT scan is done at different times in different institutions worldwide necessitating that specific consideration to be taken for such observed difference in the appearance of CT pulmonary findings according to the time of the scans.

6.   Our findings have suggested that it is the change in IL- 6 level that is of greater value in reflecting and monitoring the evolution of severe COVID- 19.

7.   Transmission may be decreased indoors with well-maintained heating and ventilation systems to maintain good air circulation and increase the use of outdoor air.

8.   All persons and child must wearing of cloth face masks, surgical masks, respirators, or other face coverings are controls for droplet transmission and keep the social distancing .

IV.   Discussion:-

In this work, the patients with COVID-19 in Egypt (Third wave)spreads from human to human mainly through the respiratory route after an infected person coughs, sneezes, sings, talks or breathes. Thepatients with COVID-19 in Egypt (Third wave)have a wide range of symptoms reported ranging from mild The most common symptoms include flu-like symptoms such asfever, dry cough, and shortness of breath. Symptoms can also include chills and repeated shaking, muscle pain, headache, sore throat, and loss of sense of taste or smell. Symptoms typically appear within 2 days to 14 days after exposure to the virus. On the other hands, the significant increase in peripheral WBC count is normal or increased and the lymphocyte count is increased.

CRP is a type very important of protein so that CRP is produced by the liver and increase in case inflammation(Mortensen *et al.,* 2001 and Marnell*et al.,* 2005).CRPlevel is highly values in bacterialor viral infections.In this work showed increase CRP levels in case COVID-19 in Egypt (Third wave),this resultsincreased

serum alanine aminotransferase and aspartate aminotransferase levels, increased lactate dehydrogenase, high CRP, and high ferritin levels may be associated with greater illness severity so that this results agreement with other studies(Coster*et al.,* 2020).In this work the significant increase in (ALT) (U/l), (AST), (U/l),but highly significant increased urea (mg %) and Creatinine(mg %).This results fromCOVID-19 patients in Egypt (Third wave) significant decreased albumin and no difference between the two groups in females and maleslymphocyte and hemoglobinthis work agreement with other studies(Guan *et al.,*2019, Wang *et al.,*2019& 2020, Wu *et al.,*2020 and Ai *et al.,*2020)

This results fromCOVID-19 patients in Egypt (Third wave) significant increased (ESR0-15 (mm/h), CRP(0-0.5 mg/dl), Serum ferritin (21.81-274.66ng/ml), PCT $\geq$ 0.05 (nmol/l), D-dimer (< 200

(ng/ml)),Troponin (< 0.03) (ng/ml),serumIL-6 level (Pg/ml), serum IL-8 level (Pg/ml) and serum IF-γ level (Pg/ml).Increased D-dimer and lymphopenia have been proposed to the cytokine storm as it remains to be one of the leading causes of mortality and morbidity in COVID-19 .In this results agreement with (Wu *et al.,*2019 & 2020)(Chen *et al.,*2019 & 2020) (Wang *et al.,* 2020) (Bernheim*et al.,* 2020).

On the other hands this results fromCOVID-19 patients in Egypt (Third wave) serum IL- 6 levels was related with clinical and laboratory parameters indicating a systemic inflammatory response, such as body temperature, CRP, and ferritin . Serum IL- 6 levels was related with more progressed chest CT assessment. Some COVID- 19 patients in Egypt (Third wave)have needed ICU and treatment immune supplements, may be due to the results more severe lung damage. In this work, CRP, ferritin, and IL- 6, decreased significantly after recovery and all patients stay at home about three months. In this work related with disease progression by exacerbating pulmonary lesions on chest CT scan and highly serum IL- 6 level in females or males.

In this results agreement with (Emery *et al.,* 2008; Norelli *et al.,* 2018). On the other hands, promising therapeutic effect of tocilizumab has recently been reported in treating severe COVID- 19 patients (Michot *et al.,* 2020; Zhang *et al.,* 2020).While there are numerous mechanisms that may cause elevation of CRP, increased IL-6 related signaling is well established as a driver of increased CRP (Moore & June 2020).IL-8 has been also shown to up regulate in the lung samples of SARS-CoV infected macaques (de Lang *et al.,* 2007).

Characteristic imaging features on chest radiographs and computed tomography CT scans may be helpful to diagnose COVID-19 patients in Egypt (Third wave)typically demonstrate bilateral air-space consolidation, though patients may have unremarkable chest radiographs early in the disease.(Guan *et al.,* 2019&2020; Lei *et al.,* 2019& 2020) .Chest CT images from patients with COVID-19 typically demonstrate bilateral, multilobar ground-glass opacities with a peripheral, asymmetric, and posterior distribution are common in early infection**.** (Chen *et al.,*2019 & 2020 ;Xu*et al.,*2019 & 2020;To *et al.,*2020;Shi *et al.,*2019 & 2020 ;Inciardi*et al.,*2019 & 2020) because this chest CT medical imaging pattern is non-specific and overlaps with other infections, CT imaging is highly medical imaging for COVID-19 may be low and dependent upon radiographic interpretation.This results agreement with (Wang *et al.,*2020)(Li Y, Xia L *et al.,*2020)

In February 2021, the scientists discovered ten vaccines are (the Pfizer–BioNTech vaccine and the Moderna vaccine), three conventional inactivated vaccines (BBIBP-CorV, Covaxin, and CoronaVac), four viral vector vaccines (Sputnik V, the Oxford–AstraZeneca vaccine, Convidicea, and one peptide vaccine (EpiVacCoronaand the Johnson vaccine).(Vaccine Centre, Tropical Medicine (2021).I hope the vaccines effective onCOVID-19.

Egypt's COVID-19 co-existence planso the Egyptian government implemented a nationwide lockdown and social safe distance with others (not less than 2 meters).measures to control the spread of COVID-19 starting in March 2020 till now. Amid COVID-19 pandemic no work incinema, theatres, cafes, restaurants, universities, schools, nurseries, gyms, sports clubs, and wedding and funeral halls. The Ministry of Health and Population has played role in overseeing the government's ongoing health response, releasing daily on total confirmed cases, recoveries, and death rates across the country.

V.   Conclusions: -

COVID-19 patients in Egypt (Third wave)with respiratory distress, we recommend clinicians closely monitor WBC count, Neutrophil count, lymphocyte count, IL-6, IL-8, IF- γ and serum ferritin, CRP as markers for potential progression to critical illness. IL-6, IL-8 and IF- γ are increased in patients with COVID-19. General regulationsClean and sanitize surfaces regularly. Usedisposable tissues when coughing and sneezing.Family members who have no virus symptoms should be the ones dealing with delivery men

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