The most important laboratory criteria for Covid -19 and their impact on the course of the disease

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Abstract:
This paper concludes from a study of corona pandemic disease in Misurata in terms of the extent of the relationship of Covid 19 to age and what are the parameters in advanced cases and factors that reduce or increase the risk of the disease and that is through collecting information from isolation centers this was between 8 – 12 / 2020 . observed continuation of mutation to virus and all young age to adult hood did no symptoms and the parameters LDH \ C-RP \D- Dimer are significant for advanced case.
Keywords: *corona virus, Misurata, severity, age.*

أهم المعايير المعملية لمرض كوفيد 19 والتي لها تأثير على سير المرض

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الملخص:
ورقة بحثية تدرس جائحة مرض كورونا في مدينة مصراتة حيث تتركز على العمر المستهدف للفيروس والعوامل التي تسبب في زيادة أو انخفاض خطر المرض وذلك من خلال جمع المعلومات من مراكز العزل وذلك في الفترة ما بين شهر 8 إلى شهر 12 / 2020 م. خلصت الدراسة إلى مقدرة الفيروس على التغير الجيني " الطفرة " وأن الفيروس ليس بالكائن الفتاك الذي يسبب هلاك للعنصر البشري فإن هناك طرق كثيرة للوقاية منه وللتغلب عليه، أيضاً خلصت الدراسة إلى أن الأعمار الصغيرة من حديثي الولادة حتى عمر 20 سنة لم تتأثر بالفيروس.
الكلمات الفتاحية : *كورونا فيروس، الطفرة، مصراتة ، شدة الاصابة ، العمر، طرق الوقاية.*

Introduction:

In 1965 a new type of virus was isolated from nasopharyngeal washings from human-patients with common colds. Electron microscopy showed that the virus particles were very similar in shape to those of infections bronchitis of chickens and marine hepatitis. They differed, however, from myxoviruses in that the fringe of radiating projections on the surface of the lipoprotein

envelope consisted of petal or clup shaped spikes that were more widely spaced than the short slender rods of myxoviruses the characteristic appearance of this ring of projections surrounding the virus is reminiscent of a crown and the name corona viruses has been suggested for this new group of viruses.At the present time the group includes a number of viruses that cause common colds in human as well as avian infections bronchitis virus murine hepatitis virus. The virus of transmissible gastroenteritis (TGE) of pigs and corona viruses have also been reported in case of neonatal calf diarrhea and turkey blue comb disease (Buxton & Fraser, 1977).

General Properties

Coronaviruses are medium sized (80–160 nm) roughly spherical and sometimes pleomorphic viruses. The club – shaped projections cover only part of the surface of the virus and are less densely packed than in myxoviruses. The central core of the virion is composed of single-stranded RNA. The viruses have lipoprotein envelopes and are sensitive to ether, chloroform and other fat solvents (Buxton & Fraser, 1977).

View Search:

Etiology:

Corona viruses (Cov) are a family of enveloped positive sense, single strand RNA (+ss RNA) viruses the SARS-COV2 virion is approximately 1.250 nm in diameter, and its genom ranges from 26 to 32 kilobase, the largest for an RNA virus.

SARs–COV2 has 5 structural proteins: Spik (S), Envelope (E), Membrane (M), Nucleocapsid (N) and Hemagglutinin – esterase (HE) the main functions of the N protein are the promotion of a complex with RNA and viral assembly after its replication the S,E , and M protein create the viral envelope. The S protein, assisted by HE is responsible for the entry of the virion into the humancell. It is a club-shaped surface projection. Giving the virus its characteristic crown like appearance on electron microscopy.

Diseases in human. Such as the common cold. The seven known species cov. Only 3 are known to cause severe infections in humans.

- Sever acute respiratory disease coronavirus (SARS – COV): emerged in 2003 in southern China from civet cats .

-Middle east respiratory syndrome coronavirus (MERS-COV): emerged in 2012 in Saudi Arabia from dromedary camels.

-SARS-COV2: emerged in December 2019 in China possible from bats or pangolins.

Find that three types of diseases are source animals though there is a type of coronavirus specialist for humans (human corona virus) the serotype to human corona virus 229 E (Thomas & Stuart, 1989).

While coved -19 have more than thirteen serotype (Korber & fischer, 2020).

Pathogenicity , transmission:

The infection is taken over across their ways.

- Air ways " air born disease " at on meter distance of the infected person.
- Contamination.
- Contact.

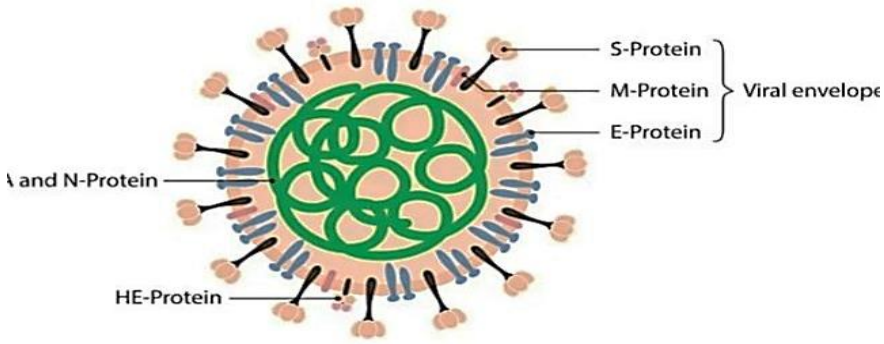

Fig. (1): shows structural proteins of the SARS-Cov2 virus. Virology lectures January 2020 by Vincent Racaniello.

When crossing agent the body SARS-COV2 binds via **S**-protein bind with host cell through angiotensin- convertingenzyme2 (ACE2) is expressed epithelial cells of the intestine, kidney , blood vessels and most abundantly cells of the lungs inducing lung damage it causes the cessation of ciliary motion which leads to the accumulation of secretion in the air ways. The virus attacks with two weapons (wan et al., 2020).

1. **S – Protein:**

   It acts by binding the virus to the hostcells receptor (ACE2) mediating viral cells entry. When the virus RNA is released polyproteins are translated from the RNA genome and replication and transcription of the viral RNA genome occur via protein cleavage and assembly of replicase transcriptase complex viral RNA is replicated and structural protein are synthesized assembled and packaged in the host cell after which viral particles are released (Belouzard et al., 2012).

2. **Hemagglutininestras (HEs):**

   Is glycoprotein that certain enveloped viruses and use as invading mechanism HEs helps in the attachment and destruction of certain sialic acid receptors that are found on the host cells surface viruses that possess HEs include influenza C virus, corona virus HEs acting both as lectins and as receptor destroying enzymes (RDEs) (van Doremalen, et al., 2016).

Replication:

A coronavirus virion (a virus particle that infects a host) goes through a replication life cycle within a host cell, thereby creating more copies of itself that can eventually infect more cells. SARS-CoV is the causative agent responsible for the 2003 SARS epidemic and an example of such a coronavirus infecting a human cell. The virion responsible for the new coronavirus outbreak in 2019 (COVID-19) is called SARS-CoV-2 and is closely related to SARS-CoV. Its life cycle, and how the disease develops, have yet to be fully resolved.

The key stages of a general coronavirus replication life cycle include binding to a host cell surface receptor, cell entry, virion uncoating, translation of replicase proteins, RNA transcription, RNA synthesis, virion assembly, and release of mature virions into the extracellular space, where the cycle can begin again.

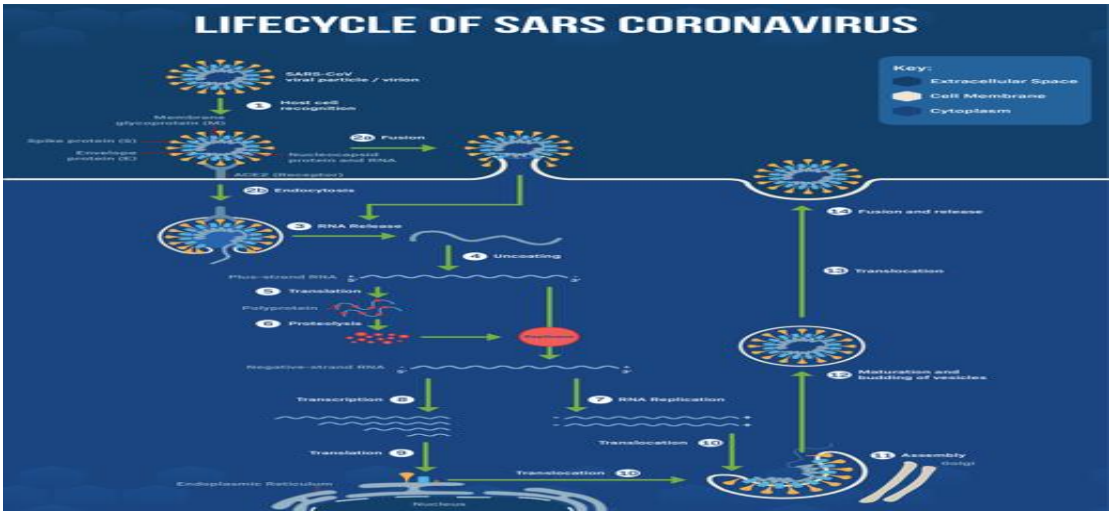

Fig. (2): The life cycle of the SARS coronavirus , according to the most recent scientific research as of 2020.(image by labXchanege The president and fellows of Harvard college).

Symptoms

Symptoms of (Covid-19) may appear incubation 2 to 14 days "Early symptoms a loss of taste or smell common symptoms fever – cough – tiredness – shortness of breath or difficulty breathing – chills – sorethroat - runny nose – headache – chest pain – pink eye (conjunctivitis).
Other less common symptoms: - rash – nausea – vomiting – diarrhea .

- Children have mild illness
- People who are older high risk .
  People who have existing chronic medical high risk. EX
- Cardiomyopathy.
- Cancer.
- Chronic obstructive pulmonary disease (COPD).
- Diabetes mellitus.
- Sever obesity.
- Chronic kidney disease.
- Sickle cell disease.
- Weakened immune system from solid organ transplant.
- Asthma.
- Liver disease.
- Chronic lung disease.
- High blood pressure.

In airport from the Chinese center for disease control and prevention that included approximately 44.550 confirmed infections with an estimation of disease severity.

- Mild disease (no or mild pneumonia) was reported in 81%.

- Sever disease (e.g. with dyspnea , hypoxia 14%).
- Critical disease (e.g. with respiratory failure shock or multi organdy's function 5%).
- The overall case fatality rate was 2.3% no deaths were reported among no critical cases (carfi et al., 2020).

Table (1): differential diagnosis (Dowdoll & Stewart, 2020).

	COVID-19	Influenza	Common cold
Incubation period	2–14 days	1–4 days	<3 days
Onset	Gradual	Sudden	Sudden
Fever	Very common	Very common	Rare
Dry cough	Very common (mild to severe)	Very common (mild to severe)	Common (usually mild, can be productive)
Fatigue	Common	Very Common	Rare or mild
Myalgia	Common	Very Common	Mild
Sneezing	Sometimes	Rare or mild	Very common
Nasal congestion	Rare or mild	Common	Very common
Headache	Sometimes	Very common	Rare or mild
Sore throat	Sometimes	Sometimes	Very common
Diarrhea	Sometimes	Sometimes	Rare
Dyspnea	Common	Rare	Never

Immunity:

Active immunity results from natural infection and neutralizing antibodies are well developed by third week after infection there are two types of immunity:

- Innate immune defenses restrict the early stages of infection and delay spread of virus these defenses include interferon and Interleukin6 (IL6).
- Adaptive immune deference.

Act by stimulating increased expression of MHC class I and II by focusing and activation cells at sick of infection NK cells are also one of the main mediators of antibody dependent cell-mediatedcytotoxicity (ADCC).

Adaptive immune depend on three principles components , Antibody , CD4 T cells , CD8 T cells (Stephen et al., 2020).

Lab workshop:

- PCR test looks for presence of the RNA of the virus.

The serology test look for the presence of antibody. Which are specific proteins made in response to infections antibody test results are important in detecting infections which few or no symptom.

Blood test:

Most of the cases that are admitted to isolation centers in Misurata especially the cases that have not been admitted ICU were parameters semi-natural with an increase in white blood cells and cases ICU the parameters lymphopenia and increase C-RP and LDH and D–Dimer, theses three parameters are considered significant of Covid19 for advanced cases.it increases with the severity of the disease.

Table (2): shows the cases entered lab workshop at ICU.

Case	LDH IU/L	C/RB mg/L	D-Dimer mg/L
1	649.9	8.8	1.2
2	471	14.1	4
3	385	9.3	4.7
4	516	28	2.5
5	738	28.8	2.7
6	516	7.3	5.9
7	487	19.2	2.4
8	615	18.3	1.3
9	375	2.01	2.04
10	500	12.1	2.9
11	393	26.7	2.5
12	363	4.8	1.1
13	572	31.5	1.2
14	246	11.1	1.4
15	551	11	2.7
16	465	4.8	1.2

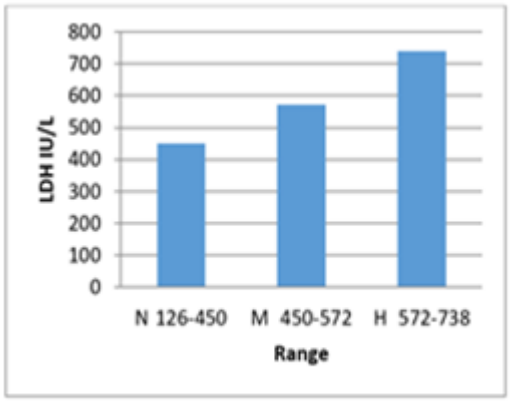

Fig. (3): shows the LDH parameter.

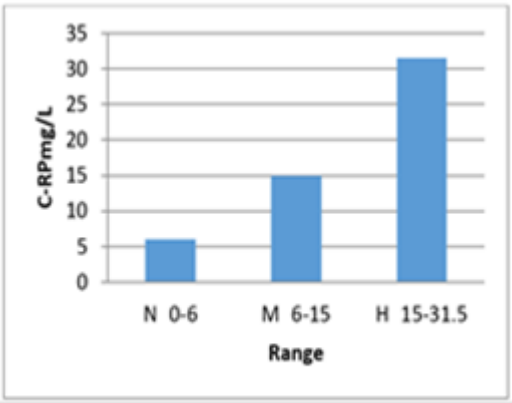

Fig. (4): shows the C-RP parameter.

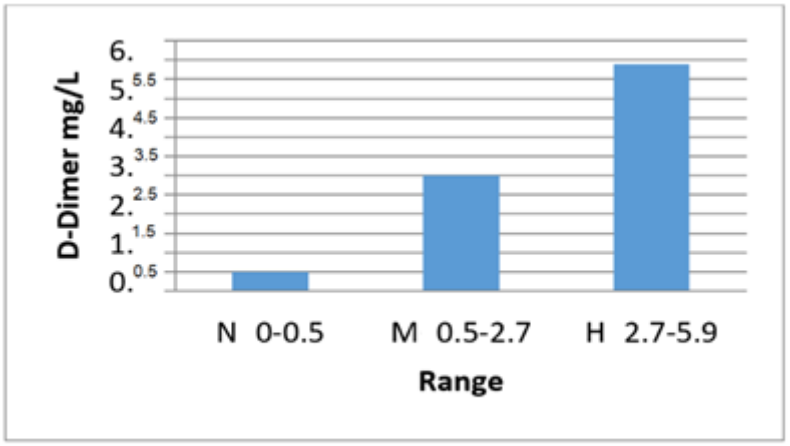

Fig. (4): shows the D-Dimer parameter.

Check point :

Lactic dehydrogenas (LDH) express about tissue damage (Chan,FKM & Moriwaki,K .et al 2013).

D-dimer a fragment produced during the degradation of a clot (berger,j & kunichoff,D & dhikari,S 2020).

C-reactive protein (CRB) it is level rises when there is inflammation (macy EM & Hayes,TE & Tracy,RP 1997).

Field observation of the isolation center for covid-19 patients:

- All pregnant women who gave birth in isolation centers had healthy new borns.
- Infantile up to the age of 20 years contact were diagnosed by PCR and in contact with positive cases were a symptomatic.
- The most critical cases in (ICU) were suffering from chronic disease as insufficiency renal function and diabetes.
- Positive cases from the age of 40–60 year it was extended from mild cases to moderate cases or sever cases
- Gender. There is no difference in the incidence between females and males data discussion and interpretation:

1- New born from the infected mothers who were negative because thymus gland are active and have role in T cells maturation.

2- there are cases among puberty ages with out symptom because thymus gland active and decreased expression of proteins including angiotensin converting enzyme 2(ACE2) according to the number 6 in previous study.

3- the most critical cases in (ICU) were suffering from chronic disease because of immune insufficiency.

4- most positive cases were among age of 40-60, because of me I have two of the reasons atrophy thymus gland life style stresses depend on nature immune system and good nutrition.

5- in search of the equally of gender while finding another research in London in 2020 the rate incidence in females lesser than males.

6- the rest of study points are the same as a lot of previous Studies.

Previous studies :

1) Largest study suggesting that the elderly are more threatened than other in China18/2/2020.

2) Corona virus may cause thrombosis inside the blood vessels. Which leads to the formation of blood clots according to the NTF German. 2/5/2020.

3) A study reveal new information about Covid-19 40 mutations occur amid expectations that the virus will evolve to become more aggressive but less affecting humans. According to the Icelandic newspaper information 25/3/2020.

4) Comparative study of check computed tomography features in young and older adults with corona virus disease. Tingting Zhu journal of thoracic, Yujing wang ncbi.nlm.nih.gov-2020

5) corona virus . why dose the impact of the crisis differ between men and women?

As the study concluded there is a slight difference incidence of woman less than men and the reason is du to the difference in hormones , university college London 2020-4-17

6) understanding the age divide in COVID19 : why are children overwhelmingly spared? K. lingappan , H .karmouty Published on line : 25-JUN-2020.

Treatment:

There is no specific treatment and is all available in isolation centers is an antipyretic + supportive treatment + oxygen therapy.

The vaccine

There are some vaccines such as:

1. AstraZeneca vaccine: protection up to 90%. This maybe one of the easiest vaccines to distributed because it does not need to be stored at very cold temperatures. It is given in two doses.
2. Pfizer-vaccine: up to 95% effective, it is given in two doses three weeks apart. The vaccine must be stored at a temperature of around -70C.
3. Moderna vaccine: this type called m RNA vaccine and uses a tiny fragment of the virus's genetic code. It protect 94.5% of people. It is given in two doses four weeks apart.

Conclusion and recommendations:

We conclude through this study the following :

1- The source of this virus is the animal and the genetic mutation that occurred for the exogenous protein " S–protein " caused the change of the host species and thus the possibility of genetic mutation at any time and results may be mild or aggressive.

2- Covid-19 disease is not considered aggressive disease as all its victims are vulnerable people which chronic disease as they suffering from suppression immunity and this was confirmed by the UK government that it is not be a " high consequence infections disease"

3- All young ages from neonatal to adult hood did not show symptoms of the disease even though they were from infected mothers or mixed with positive cases , and the explanation for this phenomenon is that these ages are in which the thymus gland is active which has a role in activating the immune system. Through its maturation of T cells and these cell play a role in " ADCC" as mentioned previously.

4- The virus has the ability to cause disease in all seasons of the year, as is was found in one of the references that the progenitor has the ability to live outside the body at a temperature of 56^{o} for half an hour.\

5- The parameters LDH, C-RP and D-Dimer are significant for advanced cases.

Recommendations

We recommend that

1- Commitment to hygiene.
2- Excessive fluid intake.
3- Social distancing.
4- Eating vegetable and fruits as they have a role in maintaining health.
5- Maintaining adequate sleep time, as they have a role in secreting the hormone melatonin which plays a role in stimulating, the immune system.

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