# مجلة روافـد المعرفــة

## تصدر عن كلية العلوم
## جـامعة الزيتـونة

**العـدد التاسـع**
**يونيو 2024**

# مجلة روافــد المعرفة

**شروط وتعليمات النشر**

1- أن يكون البحث أصيلاً ومبتكراً ولم يسبق نشره في أي جهة أخرى، وتتوفر فيه شروط البحث العلمي المعتمدة على الأصول العلمية والمنهجية المتعارف عليها في كتابة البحوث الاكاديمية.

2- أن يكون البحث مكتوباً بلغة سليمة، ومراعياً لقواعد الضبط ودقة الرسوم والاشكال – إن وجدت – ومطبوعاً ببنط (14) وبخط (Simplified Arabic)، وألا تزيد صفحات البحث عن (35) صفحة متضمنة الهوامش والمراجع.

3- يجب أن يشتمل البحث على العناصر التالية: - عنوان البحث باللغتين العربية والإنجليزية؛ - ملخص تنفيذي باللغتين العربية والإنجليزية في نحو 100-125 كلمة، والكلمات المفتاحية (keywords) بعد الملخص.

4- يتم توثيق الهوامش وفق طريقة APA (طريقة الجمعية الأمريكية السيكولوجية) بإصدارتها المختلفة.

5- يُفضل أن تكون الجداول والاشكال مدرجة في أماكنها الصحيحة، وأن تشمل العناوين والبيانات الإيضاحية الضرورية، ويراعى ألا تتجاوز أبعاد الاشكال والجداول حجم حيز الكتابة في صفحة Microsoft Word.

6- أن يكون البحث ملتزماً بدقة التوثيق، وحسن استخدام المصادر والمراجع، وأن تثبت مصادر ومراجع البحث في نهاية البحث.

7- تحتفظ المجلة بحقها في اخراج البحث وإبراز عناوينه بما يتناسب واسلوبها في النشر.

8- ترحب المجلة بنشر البحوث المكتوبة باللغة الأجنبية ويفضل أن يرفق البحث بملخص باللغة العربية (لا يتجاوز 200 كلمة).

9- ترحب المجلة بنشر ما يصلها من ملخصات الرسائل الجامعية التي تمت مناقشتها وإجازتها، على أن يكون الملخص من إعداد صاحب الرسالة نفسه.

10- تُرسل نسخة من البحث مطبوعة على ورق بحجم (A4) إلى مقر المجلة، ونسخة إلكترونية إلى إيميل المجلة: rwafedalmarefa@gmail.com، على أن يدون على صفحة الغلاف: اسم الباحث، لقبه العلمي، مكان عمله، تخصصه، رقم هاتفه وبريده الإلكتروني.

11- يخطر الباحث بقرار صلاحية بحثه للنشر من عدمها خلال مدة ثلاثة أشهر من تاريخ استلام البحث.

12- في حالة ورود ملاحظات وتعديلات على البحث من المحكم، ترسل تلك الملاحظات إلى الباحث لإجراء التعديلات اللازمة بموجبها، على أن تعاد للمجلة خلال مدة أقصاها شهر واحد.

13- الأبحاث التي لم تتم الموافقة على نشرها لا تعاد إلى الباحثين.

14- تؤول جميع حقوق النشر للمجلة.

15- دفع رسوم التحكيم العلمي والمراجعة اللغوية والنشر، إن وجدت.

**الكلمة الافتتاحية**

بسم الله الرحمن الرحيم، عليه نتوكل وبه نستعين، نحمده سبحانه كما ينبغي أن يُحمد، ونصلي ونسلم على رسوله محمد وعلى آله وصحبه والتابعين.

وبعــــد،،،

إن سبيل نهضة الأمم إنما يكون بالبحث العلمي في شتى المجالات، فدوره مهم لمواكبة التقدم والرقي بالمجتمع فبالبحث العلمي ينمى القدرات البشرية وهو الأساس في الابتكار والإبداع. بعون من الله وتوفيقه، وبعد الجهد الكبير الذي بذلته هيئة التّحرير تكاملت الاستعدادات لإصدار العدد التاسع من مجلة روافد المعرفة، والذي نأمل أن يلبي طموحات المهتمين والباحثين. ومن هنا ندعو كل الباحثين والكتاب الإسهام في استمرار المجلة بتقديم نتاجهم العلمي للنشر، ونرحب بآراء القراء والباحثين ونقدهم البناء حتى تخرج المجلة في صورتها المثلى وليكون العدد التالي أفضل من سابقه. وختاما يجدر بنا مع إصدار هذا العدد والذي يحتوي على عدد أربعة عشر بحثاً أصيلاً مختلفاً، أن نتقدم بجزيل الشكر والتقدير للمحكمين والمؤلفين وكل من أسهم في إخراجه وتصميمه، آملين أن تكون محتوياته نافعة للجميع.

والحمد لله في بدءٍ ومُخْتَتَمٍ.

هيئة التحرير

.

# المحتويات

# The effect of chronic diseases on the severity of Covid-19 disease symptoms.

*Ali G Azbida\*, Entsar Mohammed\*, Zainab Ali\*, Tarek Belkasem\*, Tarek Thabit\*, Wesal Muftah\*,  Faraj K Sagar\*, Wafa M Ali\*, and Mustafa M Omar\*\*.*

\*-Faculty of Medical Technology, Azzytona University.

\*\*- Biotechnology department, Faculty of science, Azzytona University.

a.azbida@azu.edu.ly

## Abstract:

The infection with SARS-COV-2 was first recorded in Libya on March 24, 2020, while the first case in the Tarhuna region was recorded on 28/06/2020. The severe cases of corona disease require an intensive care unit (ICU) and they are mainly are old aged cases, with at least one chronic comorbidity. This study aimed to determine the impact of chronic diseases on the severity of covid-19 disease symptoms in infected people with the coronavirus in Tarhuna region. Data of 149 infected people with Covid-19 disease up to 31-05-2021 were collected. The ratio of Covid-19 positive cases was 1128 (0.49%) out of the total population of the Tarhuna region, while the study sample represented 149 (13.21%) from the total infected people in Tarhuna. The results showed that symptoms of fever, headache, and dyspnea were common among infected cases. Symptoms of loss of sense of smell and taste, coughing and general fatigue were more common in males than females. 71.81% of infected cases were chronic diseases patients and have suffered from four or more severe symptoms, which lasted for long periods. The finding highlights the impact of chronic disease on the severity of symptoms of coronavirus infection. Further studies should be carried out to establish this impact on large scale samples.

_____

Keywords: COVID-19, coronavirus, chronic disease, comorbidities, and severity.
_____أ_____

## الملخص

تم تسجيل أول إصابة بفيروس SARS-COV-2 في ليبيا في 24 مارس 2020 ، بينما تم تسجيل الحالة الأولى في منطقة ترهونة في 2020/06/28. تتطلب الحالات الشديدة لمرض الكورونا الدخول لوحدة عناية مركزة (ICU)، وهذه الحالات في الأساس تكون متقدمة في العمر وتعاني من مرض مزمن واحد على الأقل. هدفت هذه الدراسة إلى تحديد تأثير الأمراض المزمنة على شدة أعراض مرض كوفيد -19 لدى المصابين بفيروس كورونا في منطقة ترهونة. تم جمع البيانات 149 من شخصًا مصابًا بمرض Covid-19 بمنطقة ترهونة حتى 2021-05-31. بلغت نسبة الحالات الإيجابية للمصابين بفيروس كورونا (0.49٪) من إجمالي سكان منطقة ترهونة أي 1128حالة، بينما مثلت عينة الدراسة 149 حالة (13.21٪) من إجمالي المصابين في ترهونة. وأظهرت النتائج أن أعراض الحمى والصداع وضيق التنفس كانت هي الشائعة بين الحالات المصابة. كما كانت أعراض فقدان حاسة الشم والتذوق والسعال والإرهاق العام أكثر شيوعًا عند الذكور أكثر من الإناث. 71.81٪ من الحالات المصابة كانوا يعانون من أمراض مزمنة، وظهرت عليهم أربعة أو أكثر من أعرض كورونا الحادة والتي استمرت لفترات طويلة. وقد استطاعت نتائج هذه الدراسة تسليط الضوء على تأثير المرض المزمن على شدة أعراض الإصابة بفيروس كورونا. يجب إجراء المزيد من الدراسات لتحديد هذا التأثير على عينات دراسة كبيرة.

_____أ

الكلمات المفتاحية: فيروس كورونا، الأمراض المزمنة والأمراض المصاحبة.

## 1. Introduction

A novel coronavirus (SARS-Cov2) is a new viral strain in humans, it belongs to a zoonotic virus family, Ex, Severe Acute Respiratory Syndrome (SARS-CoV-1) which is transmitted to humans from civet cats, and Middle East Respiratory Syndrome (MERS-CoV) which transmitted from camels to humans. Approximately 30 types of CoV have been identified in humans, birds, and mammals (WHO -Africa, 2020). Covid-19 has a wide range of clinical severity, ranging from asymptomatic disease to the mild illness that usually represents the largest portion of patients, to severe disease which leads to the development of acute respiratory syndrome, and multi-organ failure (Guan et al., 2019). Common signs of Covid-19 include high fever (>38°C), respiratory symptoms, dry cough, dyspnea, fatigue, vomiting, myalgia, headache, and diarrhea; on the other hand, in more severe cases the infection can lead to a severe acute respiratory syndrome, pneumonia, kidney failure and even death in many cases (WHO – Africa, 2020; Rothan and Byrareddy,2020). The comorbidities that appear frequently in hospitalized patients with Covid-19 are cardiovascular disease (CVD), diabetes mellitus (DM), obesity, and chronic respiratory failure (Richardson et al., 2020).

A meta-analysis has demonstrated that critical/fatal patients with Covid-19 had a significantly higher incidence of chronic diseases such as DM, CVD, and chronic respiratory disease compared to non-critical patients (Zheng et al., 2020). The case of fatality risk for patients without comorbidities is 0.9%, while chronic diseases significantly increase this risk. (Wu and McGoogan, 2020).

The fact about Covid-19 disease is that most of severe cases require an admission to intensive care unit (ICU) are significantly aged patients that had at least one comorbidity disease, including DM, and CVD more than patients that did not require ICU admission (Wang D et al., 2020 and Huang et al., 2020).

Previous studies of Denova-Gutierrez et al. (2020), Kammar-Garcia et al. (2020), and Wang L et al. (2020), reported that patients having multiple comorbidities with Corona disease increases the risk of mortality compared to having one or no concomitant disease.

Assessing the prevalence of these chronic diseases is the basis for mitigating complications in Covid-19 patients.

To get more convincing results, this study will provide a systematic evaluation and detail, which not only estimates the prevalence of comorbidities among corona patients but also assess the risk of underlying diseases on them.

In the current study, comorbidities that were commonly considered in many previous studies were included, such as DM, CVD, lung disease, and kidney disease.

The results may help patient management in addition to develop new policies for prevention and response to Covid-19 and its critical outcomes.

Aim of the study:

This study is aimed to determine the impact of chronic diseases on the severity of corona disease symptoms in coronavirus patients.

MATERIALS AND METHODS:

The present study was conducted in Tarhuna region (northwestern Libya), data were collected from 149 people who were confirmed infected with Covid-19 disease (according to the results of the real-time polymerase chain reaction (RT-PCR) test approved by the reference laboratory of the National Center for Disease Control).

Data collection method:

A well-designed questionnaire was used for the study in Arabic, it was presented to experts for verification and review, then submitted to 200 patients with a Covid-19 disease in Tarhuna region. The questionnaire included many relevant questions such as gender, age, corona symptoms, in addition to other questions that help to understand the epidemiological situation. A total of 153 questionnaires were answered by the respondents and returned, 4 of which were invalid (excluded), while 149 questionnaires were valid which were included in the study.

Statistical analysis:

The obtained results were presented in tables or graphs and analyzed using the Statistical Package for Social Science (SPSS) version (19) software to achieve valid and reliable results from this study. P values ($< 0.05$ were considered statistically significant).

RESULTS:

The results of this study show that the ratio of CoV-19 positive cases in the Tarhuna region represents 0.49% of the total population of the region, while the study sample represented 13.21% of the total infected people in the region as elucidated in Table 1

Table 1: Covid-19 within Tarhuna.

| Total population of Tarhuna | 231651 |
|---|---|
| Recorded cases of corona | 1128 (0.49 % from the population) |
| The study sample | 149 ( %13.21 from corona cases) |

In this study, male cases constituted 58.39%, while females represented 41.61% cases, as shown in figure 1.

**Gender of cases**
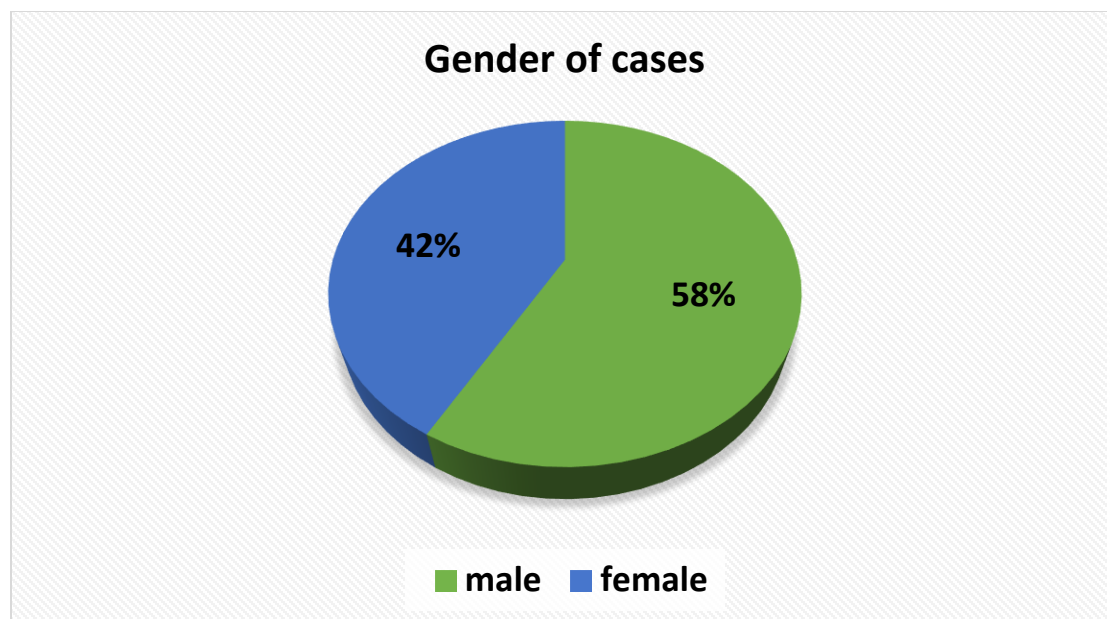


Figure1: distribution of the study sample according to gender.

The results showed a statistical significance (P= 0.024) between ratios of (positive, cured, and death) cases in Tarhuna compared to Libya, where ratios were (0.61%, 0.37%, and 1.60%) respectively, while these percentages of Libya compared to the world were (0.11%, 0.11%, and 0.09%) respectively, as shown in table 2.

Figure 2 shows comparison of the recovery and death rates in Tarhuna, Libya, and the world. The results found that the ratio of those recovered and deaths in Tarhuna was 56.91% and 4.43% respectively. The results show there is the statistical significance (P= 0.011).

Table 2: Elucidates the number of Covid-19 cases in the Tarhuna region compared to Libya and the World up to 31/05/2021

|  | Tarhuna | Libya | world | Tarhuna to Libya Ratio | Libya to world Ratio |
|---|---|---|---|---|---|
| Total cases | 1128 | 186072 | 170353000 | 0.61% | 0.11% |
| cured cases | 642 | 172117 | 153000000 | 0.37% | 0.11% |
| deaths | 50 | 3127 | 3542000 | 1.60% | 0.09% |
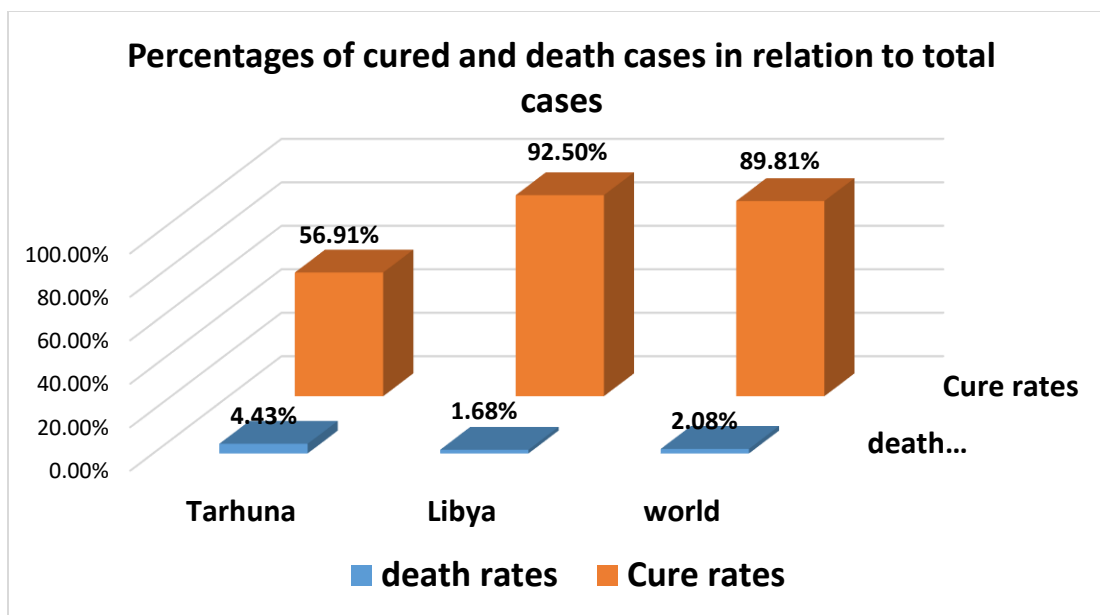
Figure 2: The rates of recovery and death cases to the total recorded positive cases.

The participants in the current study were distributed into two age groups as follows: The first category included cases whose ages were less than 40 years and their number was 60 (40.27%) cases, 17 of them complained from severe symptoms, the second age group included the cases whose ages were more than 40 years, and contained 89 (59.73%) cases, 64 of them complain from severe symptoms, as shown in figure 3.
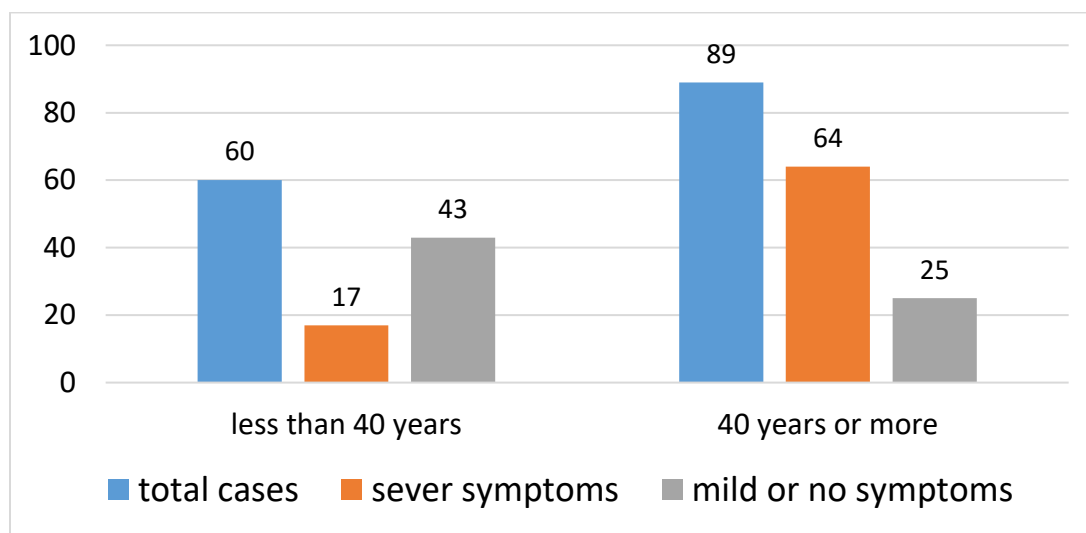


Figure 3: describes the percentages of Covid-19 cases in the Tarhuna region according to age groups.

Regarding the Covid-19 symptoms that appeared in the studied cases, it was found that the symptoms ranged from mild, moderate to severe and the most of cases suffered from more than one symptom. It has been found that the symptoms of loss of sense of smell and taste, high temperature, headache, and dyspnea were the most common with (69.80%, 66.44%,

58.39%, 57.05%) respectively, these were followed by symptoms of loss of appetite, joint pain, cough, and sore throat (55.71%, 51.00%, 44.97%, 43.62%) respectively, eventually, diarrhea and general fatigue symptoms were (32.89%, 26.85%) respectively, while 6 cases (4.03%) of the study sample did not show any symptoms as seen in figure 4.



Figure 4: Symptoms of covid-19 patients in the Tarhuna region.

Comparison of the symptoms in both sexes cases, showed no significant differences between males and females (P= 0.325), although the symptoms of loss of sense of

smell and taste, as well as coughing and general fatigue, were more common in males than females, as shown in figure 5.

**COVID-19 symptoms in both sexs**

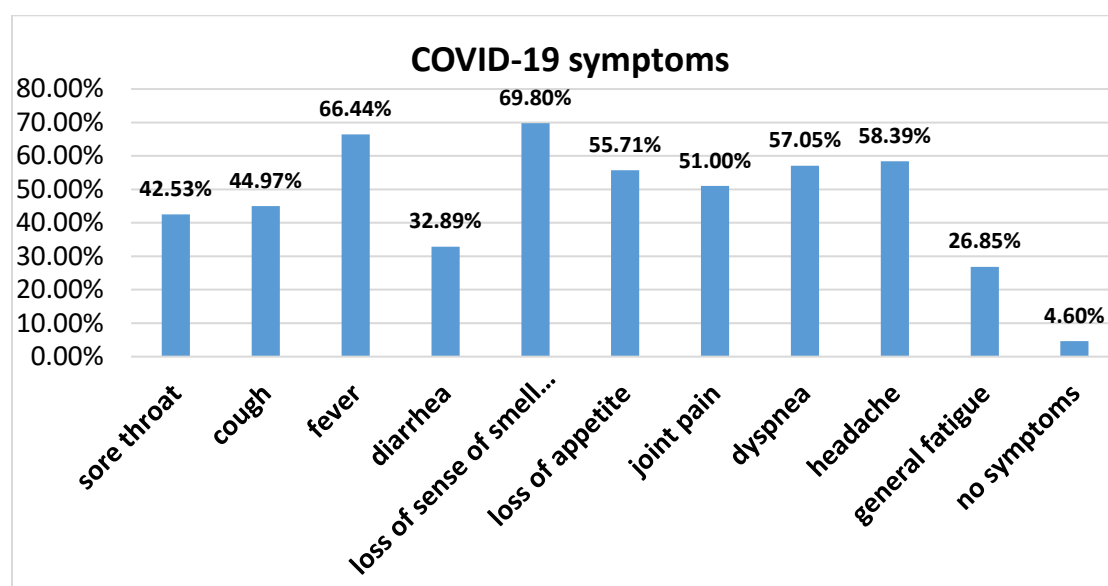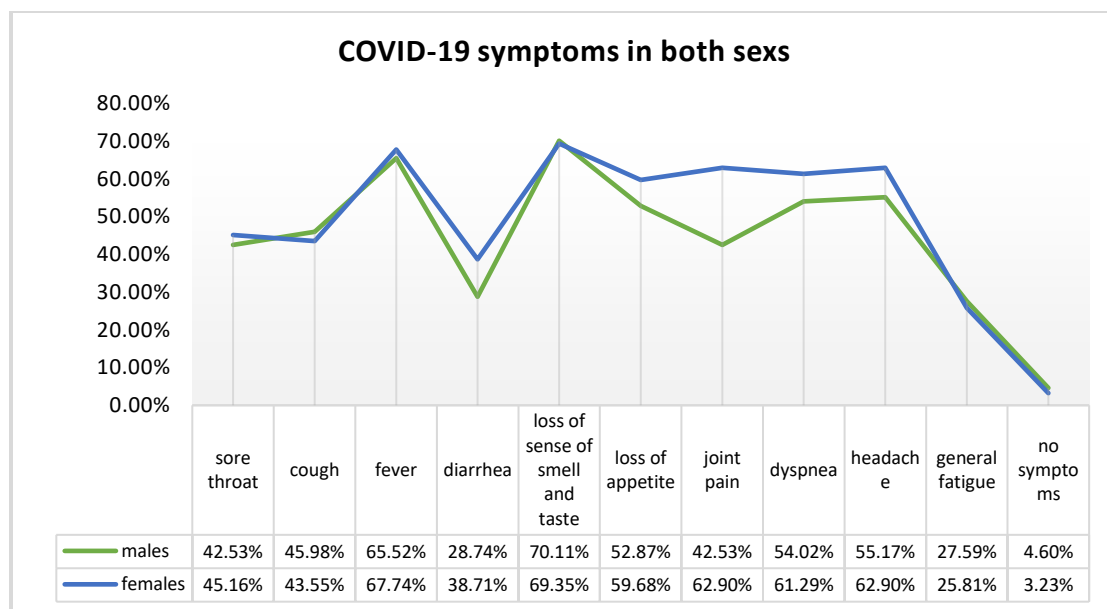| | sore throat | cough | fever | diarrhea | loss of sense of smell and taste | loss of appetite | joint pain | dyspnea | headache | general fatigue | no symptoms |
|---|---|---|---|---|---|---|---|---|---|---|---|
| males | 42.53% | 45.98% | 65.52% | 28.74% | 70.11% | 52.87% | 42.53% | 54.02% | 55.17% | 27.59% | 4.60% |
| females | 45.16% | 43.55% | 67.74% | 38.71% | 69.35% | 59.68% | 62.90% | 61.29% | 62.90% | 25.81% | 3.23% |

Figure 5: Symptoms of Covid-19 in males and females in the study sample.

The study has found that the most common chronic diseases within the study sample are CVD which was recorded in 29 cases, followed by respiratory diseases and DM (24 cases for each), while only two cases were suffering from chronic kidney diseases, on the other hand, 82 cases do not suffer from any chronic diseases, as shown in table 3.

Table 3 shows the numbers of cases suffering from chronic diseases in the study sample.

| Chronic disease | total | males | females |
|---|---|---|---|
| respiratory diseases | 24 (16.12%) | 12 (8.05%) | 12 (8.05%) |
| Cardiovascular diseases | 29 (19.46%) | 18 (12.08%) | 11 (7.38%) |
| diabetes | 24 (16.12%) | 15 (10.07%) | 9 (6.04%) |
| kidney diseases | 2 (1.34%) | // | 2 (1.34%) |
| No chronic disease | 82 (55.03%) | 47 (31.54%) | 35 (23.49%) |

Among 24 cases that suffer from chronic diseases related to the respiratory system, it was found that 19 (79.17%) cases suffered from multiple and severe covid-19 symptoms, that persisted up to 45 days.

While 29 (19.46%) cases of patients with cardiovascular diseases complained of severe symptoms of coronavirus infection lasted up to 35 days.

22 (91.67%) out of 24 diabetic cases had severe symptoms lasted from 7 to 38 days. Whereas the severe symptoms lasted up to 17 days in two cases of chronic kidney diseases.

The study has found that 107 cases among the covid-19 patients suffered from four symptoms or more, and the most of them were patients with chronic diseases. The results showed statistical significance between chronic diseases and Covid-19 severity (P= 0.003).

## 2.  Discussion

A novel coronavirus (nCoV) is a new strain belongs to a large zoonotic virus family. Nearly 30 types have been identified in humans, birds, and mammals, and can cause many diseases ranging from the common cold to more severe illnesses such as, severe acute respiratory syndrome (SARS-CoV) which is transmitted to humans from civet cats and Middle East Respiratory Syndrome (MERS-CoV) which is transmitted from camels to humans.

The results of the current study showed that the ratio of Covid-19 cases in the Tarhuna region is high compared to the ratio of Libya's infections to the world cases. The ratio of recovering among Tarhuna cases was considered low compared to the ratio of those recovering in Libya at the same period. While the ratio of the death due to Covid-19 within Tarhouna is considered high compared to the total deaths in the country, this can be attributed to the infection of many elderly people in the region or those who suffer from chronic diseases, with the lack of health institutions capable of dealing with critical cases (Muniyappa and Gubbi, 2020), in addition to the lack of isolation centers for corona patients in Tarhuna.

The average age of the study sample was 43.52 years, the age group older than 40 years were most susceptible to infection, and it appears that the number of infected people increases with older ages, this is consistent with some previous studies (Muniyappa and Gubbi, 2020).

It became clear from the current study that the symptoms of loss of sense of smell and taste were the most common among patients, this is consistent with some studies that considered the sense of smell as an indicator that can be dependent in diagnosing Covid-19 disease more than coughing and fever (Micheal, 2021).

It was found that the most common chronic diseases in the study sample were CVD, followed by respiratory diseases and DM. The majority of patients with chronic diseases suffered from four or more severe corona symptoms that lasted for a long time, this indicates that patients with chronic diseases suffer from severe corona symptoms. The obtained results are in agreement with many previous results reported in several studies (Huang et al., 2020 and Wang D et al, 2020). The critical/fatal cases with the Covid-19 had a significantly higher incidence of chronic diseases such as DM, CVD, and chronic respiratory disease compared to non-critical

cases (Zheng et al., 2020 and Wu and McGoogan, 2020). The important fact about Covid-19 disease is that severe cases which require admission to the ICU are old aged patients than those do not require ICU admission, and/or had at least one comorbidity disease (Wang D et al., 2020). The results indicate the impact of chronic disease on the severity of infection with the Coronavirus.  Also, the results showed cases with chronic respiratory diseases have suffered from multiple and severe corona symptoms persisted for long periods, this indicates the relationship between chronic infection of the respiratory system and the exacerbation of corona symptoms. These findings are consistent with several previous results which demonstrated that patients with CRDs are at risk of severe or critical SARS-CoV-2 infection, and studies of Wu and McGoogan (2020) which reported that COPD is one of the most observed risk factors for severe disease progression and increases the risk of severe Covid-19 nearly fourfold.

It has been found that, 96.55% of patients with CVD had severe symptoms that lasted for long periods, which is similar to the results of previous studies (Zhou et al., 2020), indicating that CVD is an important risk factor for disease severity and the mortality rate of Covid-19 patients (Wu and McGoogan, 2020).

Diabetes is one of the most frequently observed comorbidities in Covid-19 patients, with a rate reached 44.5% in critical cases (Hu et al., 2020), this is similar to the results of this study, as the symptoms of the Covid-19 virus that appeared on 91.67% of diabetic patients were severe and lasted up to 38 days, these results are also consistent with several previous studies such as the Wu and McGoogan (2020) in China, the Richardson (2020) in New York City, as well as the Huang et al. (2020) study which demonstrated that diabetes is associated to poor outcomes for Covid-19 disease.

The results also showed that the symptoms of the coronavirus infection were severe and lasted for 17 days in the two cases who were suffering from kidney diseases, and this is in line with many previous studies, such as the study conducted in the United States who showed that out of 7162 confirmed cases of Covid-19, CKD was 12 times more frequent among those admitted to the ICU than non-hospitalized patients (CDC 2020).

## 3.　Conclusion and Recommendations

Coronavirus is a dangerous and rapidly spreading within the Libyan society. The rates of Covid-19 cases and deaths in Tarhuna region were high, while the ratio of those recovered was low in comparison to rates of the country. The most of cases suffered from severe symptoms were the elderly, especially chronic diseases patients. The paper recommends:

- Taking attention and care of the elderly especially those who suffer from chronic diseases, to prevent them from contracting this disease.

- Accelerating the vaccination process of elderly and people affected by chronic diseases.

- Develop effective and urgent plans to treat infected people, in addition, to preparing an isolation center for corona patients in Tarhuna.

- Conducting further research studies on all aspects of Covid-19 disease to develop effective control plans and programs to reduce the spread of the disease and mitigate its various effects based on scientific foundation.

## 4. References

- CDC COVID-19 Response Team (2020) Preliminary estimates of the prevalence of selected underlying health conditions among patients with coronavirus disease 2019 – United States, February 12–March 28, 2020. MMWR Morb Mortal Wkly Rep;69(13):382–386. DOI:10.15585/mmwr.mm6913e2

- Conti P, and Younes A (2020) Coronavirus COV-19/SARS-2 affects women less than men: clinical response to viral infection. J Biol Regul. Homeist Agents.34(2) 339 -343. DOI: 1023812.

- -Denova-Gutierrez E, Lopez-Gatell H, Alomia-Zegarra J L, Lopez-Ridaura R, Zaragoza-Jimenez C A, Dyer-Leal D D, … Barquera S (2020) The association between obesity, type 2 diabetes, and hypertension with severe COVID-19 on admission among Mexicans. Obesity;28(10): 0–3. DOI:10.1002/oby.22946

- Guan W-j, Ni Z-y, Hu Y, Liang W-h, Ou C-q, He J-x … Zhong N (2020) Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med;382:1708-1720. DOI:10.1056/NEJMoa2002032

- Huang I, Lim MA, and Pranata R (2020) Diabetes mellitus is associated with increased mortality and severity of disease in COVID-19 pneumonia - A systematic review, meta-analysis, and meta-regression. Diabetes Metab Syndr;14(4):395-403. DOI: 10.1016/j.dsx.2020.04.018. Epub 2020 Apr 17.

- Hu Y, Sun J, Dai Z, Deng H, Li X, Huang Q … Xu Y (2020) Prevalence and severity of coronavirus disease 2019 (COVID-19): A systematic review and meta-analysis. J Clin Virol;127:104371 doi: 10.1016/j.jcv.2020.104371

- Kammar-García A, Vidal-Mayo J J, Vera-Zertuche J M, Lazcano-Hernández M, Vera-López O, Segura-Badilla O … Navarro-Cruz A R (2020) IMPACT OF COMORBIDITIES IN MEXICAN SARS-COV-2-POSITIVE PATIENTS: A RETROSPECTIVE ANALYSIS IN A NATIONAL COHORT. Revista de investigacion clinica; organo del Hospital de Enfermedades de la Nutricion;72(3):151–158. https://doi.org/10.24875/RIC.2000020

- Micheal Marshall (2021) COIVD's toll on smell and taste: what scientists do and don't know. Nature. 14 January 2021.

- Muniyappa R, and Gubbi S (2020) COVID-19 pandemic, coronavirus, and diabetes mellitus. American Journal of Physiology, Endocrinology, Metabolism and

Gastrointestinal Physiology. 2020; doi:10.1152/ajpendo.00124.2020.

- Richardson S, Hirsch JS, Narasimhan M, Crawford JM, McGinn T, Davidson KW … Zanos TP (2020) Presenting Characteristics, Comorbidities, and Outcomes Among 5700 Patients Hospitalized With COVID-19 in the New York City Area. JAMA;323(20):2052-2059. doi: 10.1001/jama.2020.6775.

- Rothan HA, and Byrareddy SN (2020) The Epidemiology and Pathogenesis of Coronavirus Disease (COVID-19) Outbreak. J Autoimmun;109, https://doi.org/10.1016/j.jaut.2020.102433.

- -Wang L, Foer D, Bates D W, Boyce J A, and Zhou L (2020) Risk factors for hospitalization, intensive care, and mortality among patients with asthma and COVID-19. J Allergy Clin Immunol;146(4):808-812. doi: 10.1016/j.jaci.2020.07.018. Epub 2020 Jul 29.

- Wang D, Hu B, Hu C, Zhu C, Liu X, Zhang J. … Peng Z (2020) Clinical characteristics of 138 hospitalized patients with 2019 novel corona-virus infected pneumonia in Wuhan, China. Jama;323(11):1061-9. doi: 10.1001/jama.2020.1585.

- WHO - Africa (2020) Coronavirus disease: What you need to know. United Republic of Tanzania. Retrieved from https://www.afro.who.int/news/coronavirus-disease-what-you-need-know

- Wu Z, and McGoogan JM (2020) Characteristics of and Important Lessons from the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72 314 Cases from the Chinese Center for Disease Control and Prevention. Jama; 323:1239-42. doi:10.1001/jama.2020.2648.

- Zheng Z, Peng F, Xu B, Zhao J, Liu H, Peng J …Tang W (2020) Risk factors of critical & mortal COVID-19 cases: A systematic literature review and meta-analysis. J Infect;81(2):e16-e25. doi: 10.1016/j.jinf.2020.04.021.

- Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z … Coa B (2020) Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. Lancet;395(10229):1054-62 doi: 10.1016/S0140-6736(20)30566-3.