

# MEDICUS

ISSN 1409-6366 UDC 61 Vol · 28 (3) · 2023

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## **Betimi i Hipokratit**

*Në çastin kur po hy në radhët e anëtarëve të profesionit mjekësor premtoj solemnisht se jetën time do ta vë në shërbim të humanitetit. Ndaj mësuesve do ta ruaj mirënjohjen dhe respektin e duhur. Profesionin tim do ta ushtroj me ndërgjegje e me dinjitet. Shëndeti i pacientit tim do të jetë brenga ime më e madhe. Do t'i respektoj e do t'i ruaj fshehtësitë e atij që do të më rrëfëhet. Do ta ruaj me të gjitha forcat e mia nderin e traditës fisnike të profesionit të mjekësisë.*

*Kolegët e mi do t'i konsideroj si vëllezër të mi.*

*Në ushtrimin e profesionit ndaj të sëmurit tek unë nuk do të ndikojë përkatësia e besimit, e nacionalitetit, e racës, e politikës, apo përkatësia klasore. Që nga fillimi do ta ruaj jetën e njeriut në mënyrë absolute. As në kushtet e kërcënimit nuk do të lejoj të keqpërdoren njohuritë e mia mjekësore që do të ishin në kundërshtim me ligjet e humanitetit. Këtë premtim po e jap në mënyrë solemne e të lirë, duke u mbështetur në nderin tim personal.*

## **The Oath of Hippocrates**

*Upon having conferred on me the high calling of physician and entering medical practice, I do solemnly pledge myself to consecrate my life to the service of humanity. I will give my teachers the respect and gratitude which is their due. I will practice my profession with conscience and dignity. The health of my patient will be my first consideration. I will respect the secrets which are confided in me, even after the patient has died. I will maintain by all the means in my power, the honor and the noble traditions of the medical profession.*

*My colleagues will be my brothers.*

*I will not permit considerations of religion, nationality, race, party politics or social standing to intervene between my duty and my patient. I will maintain the utmost respect for human life from its beginning even under threat and I will not use my medical knowledge contrary to the laws of humanity. I make these promises solemnly, freely and upon my honor*

Medical Journal

# MEDICUS

ISSN 1409-6366 UDC 61 Vol · 28 (3) · 2023

Revistë Shkencore Nderkombëtare e Shoqatës së Mjekëve Shqiptarë të Maqedonisë  
International Journal of Medical Sciences of the Association of the Albanian Doctors from Macedonia

Botues/ Publisher: **SHMSHM / AAMD**

Tel. i Kryeredaktorit / Contact: **+389 (0) 71 240 927**

Zhiro llogaria / drawing account: **200-000031528193**

Numri tatimor / tax number: **4028999123208**

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Medicus shtypet në tirazh: 600 ekzemplarë  
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### **Printed in:**

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The Journal Medicus is printed and distributed free  
of charge with a circulation of 600 copies.

# DEMOGRAPHIC CHARACTERISTICS OF COVID-19 PATIENTS FOLLOWED BY X-RAY IN THE GENERAL HOSPITAL IN KOCHANI IN THE PERIOD BETWEEN 09.2020 - 09.2022

Mogilevska-Gruevska Dragana<sup>1</sup>, Bosevska Golubinka<sup>2</sup>, Kocanski Dragan<sup>3</sup>, Postolovska Marija<sup>4</sup>

<sup>1</sup>PHI - General Hospital - Kochani

<sup>2</sup>University „Goce Delcev” - Stip

<sup>3</sup>Institute of Public Health – Skopje

<sup>4</sup>Centar for Public Health – Kocani

Medicus 2023, Vol. 28 (3): 371-378

## ABSTRACT

In March 2020, The World Health Organization - WHO declared COVID 19 pandemics (Coronavirus disease 2019) caused by the virus SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2). WHO declared the end of the pandemics on May 5, 2023 with a total of 765 222 932 infected people in the whole world and almost 7 million deaths. In PHI General Hospital with Extended Activity - Kochani, as one of the COVID-19 centers, the patients from the east of the country (Kochani, Vinica, M. Kamenica, Delchevo, Berovo, Pehchevo, Zrnovci and the municipality of Chesinovo-Obleshevo) were followed roentgenologically.

The pathogenesis of SARS-CoV-2 on the lung parenchyma is the main factor in the roentgenological presentation of the disease.

The main goal of the research is the analysis of comparison of the demographic characteristics of COVID-19 patients and those of patients with other lung diseases which were also followed in the hospital in Kochani.

Subject: retrospective-prospective study of roentgenograms (taken in the hospital) of lungs in one projection divided in three groups (group A, group B and control group O).

Methods: statistical analysis of the demographic data of COVID-19 patients and patients with non-COVID-19 lung diseases in the hospital in Kochani.

The number of people infected with COVID-19 is higher in the urban environment, also there is a difference in the male-female percentage among the A, B and O group and in all three groups in which the research was conducted it was noticed that the highest number of infected people is of the age group between 60-70 years old.

Key words: COVID-19, roentgenogram, statistical demographic analysis.

## INTRODUCTION

In March 2020, WHO (World Health Organization) declared COVID-19 pandemics (Coronavirus disease 2019) which is caused by the SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2). (Chen N et al. 2020)

WHO declared the end of the pandemics on May 5, 2023 with a total of 765 222 932 infected people in the whole world and almost 7 million deaths.

The end of pandemics does not mean that SARS-Co-2 virus does not circulate. Instead, it continues to be present among human population with a minor trend as well as to mutate which makes it easier for a new variant to appear with smaller or higher capacity of:

- quick transmission
- cause of epidemics/ pandemics
- infected people with easier or more difficult clinical

picture and complications.

The public health institution in Kochani is a secondary level institution according to the health systematization and it acts as a link between the primary healthcare (family doctors) and the third level health institutions.

By appointing the institution as COVID-19 center during the pandemics, it was necessary to find a solution how to adapt the approach to diagnostics for these patients in accordance with the available hospital capacity.

The X-ray was used to examine patients from the east part of the country which are the following municipalities and cities: Kochani, Vinica, M. Kamenica, Delchevo, Berovo, Pehchevo, Zrnovci as well as the municipality of Cheshinovo-Obleshevo.

### PATHOGENESIS OF THE DISEASE

The pathogenic mechanism of SARS-CoV-2 on the lung parenchyma is the main factor in the presentation of the disease.

Factors for predominance and manifestation of respiratory symptomatology are the following:

- direct contamination of respiratory system i.e. the pneumocytes
- alveoli are depot for virus replication
- the big surface of the alveoli.

The damage of the lung parenchyma caused by SARS-CoV-2 is usually presented by two mechanisms:

Direct attack of the virus to the pneumocytes attaching itself to the Angiotensin Converting Enzyme 2 (Angiotensin Converting Enzyme 2 ACE 2). (Gregor Maidic, 2020)

Indirect or so called "Cytokine Storm", excessive immune reaction of the organism. (Mogilevska-Gruevska D. et al. 2022)

By interpreting the X-RAY of COVID-19 patients leaded by the Fleishner society glossary and also in correlation with the pathological presentation, the following x-ray findings are found:

Hazy shading

Ground glass opacity shading - GGO

Reticular shading

The most common complications in the lungs found in these patients are the following:

consolidation (lobar or lobular pneumonia),

pleural effusion,

pleuropneumonia

The X-ray findings in COVID-19 patients are the atypicality and the distinctiveness of contaminating both lungs, multifocality and the special zonal distribution. (Mogilevska-Gruevska D. et al. 2021)

### RESEARCH GOAL

Analysis and comparison of the demographic characteristics of COVID-19 patients who were X-ray examined in the PHI Kochani against the characteristics patients with other (non-COVID-19 related) lung diseases.

### MATERIAL USED

X-RAY films (dimensions: 35x35cm for women and 35x43 for men), films and cassettes;

Digital X-RAY machine "SHIMADZU";

MobiEye 700 - Mindray, transportable X-RAY apparatus;

Special dark room and apparatus "Kodak Medical X-Ray Processor";

Negatoscope for X-Ray film analysis

Retrospective-prospective study of conventional roentgenograms (X-Ray films) of chest organs in one projection i.e. postero-anterior of patients from PHI with extended activity - Kochani, are divided in three groups:

A. First group (A) comprises of the patients who are confirmed as SARS-CoV-2 positive by Polymerase Chain Reaction test (PCR) and who have developed positive clinical picture within 1-7 days. This group is subdivided into three subgroups according to the severity of the radiological presentation and the resulting complications (mild, severe and with resulting complications),

B. The second group comprises of the patients who got negative or non-conclusive PCRs, but still got atypical and distinctive X-Ray presentation same like the COVID-19 patients.

O. The control group comprises of the patients encountered during everyday routine check ups who have normal X-Ray signs for pneumonia (lobar, lobular, interstitial), bronchopneumonia, pleuritis and pleuropneumonia in order to perceive the difference and highlight the atypicality and distinctiveness of the radiological finding of COVID-19 patients.



**METHODS**

Statistical analysis of the demographic data of COVID-19 patients and patients with non-COVID-19 related lung diseases who were followed radiologically in PHI with extended activity - Kochani.

**RESULTS (A)**

Application of basic statistical analysis of the demographic data of first group A i.e. patients confirmed as SARS-CoV-2 positive on PCR who have developed positive clinical picture within 1-7 days.

Graph 1A shows the number of COVID-19 patients in village/town ratio expressed in percentage. (Graph 1A)

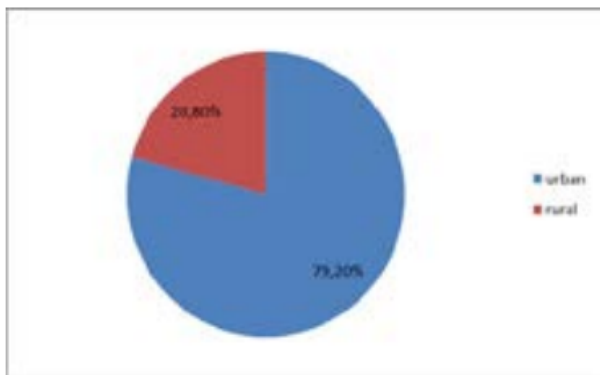
Total of 79,2 % belongs to the urban population, while 20.8% belongs to the rural population.

The municipalities of Zrnovci and Cheshinovo-Obleshevo as rural municipalities are included in the rural population.

Orizari has recently become suburban area of the city of Kochani. Therefore, its number of COVID-19 patients has been included in the number of Kochani's COVID-19 patients.

Graph 1A (number of sick patients in village/town ration expressed in percentage)

Graf. 1A



2. Graph 2 shows the number of COVID-19 patients in municipality ratio: Kochani, Vinica, Delchevo, Berovo, Pehchevo, M.Kamenica, Zrnovci and Cheshinovo-Obleshevo. (Graph 2A)

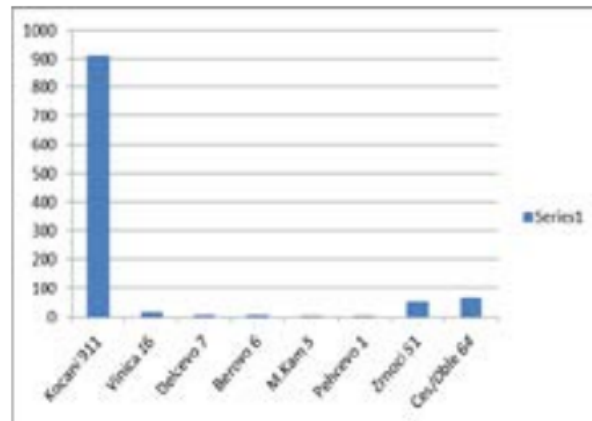
One case has been registered from each of the following cities: Bitola, Radovish and Probishtip.

Two cases have been registered from each of the cities of Kumanovo, Valandovo and 8 cases from Skopje.

One case has been registered from Holland (private patient).

Graph 2A (number of COID-19 patients who have done an X-ray in the hospital expressed in municipality ratio from the region):

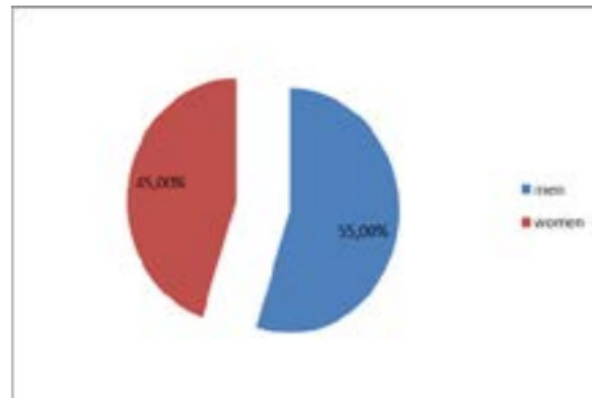
Graph 2A



3. Out of the total number of 1170 patients in the first group who were confirmed as SARS-CoV-2 positive by PCR and who have developed positive clinical picture within 1-7 days, in collaboration with the family doctors and the COVID-19 center, we have made 644 male X-rays and 526 female X-rays. )

Graph 3A ( COVID-19 male/female ratio expressed in percentage):

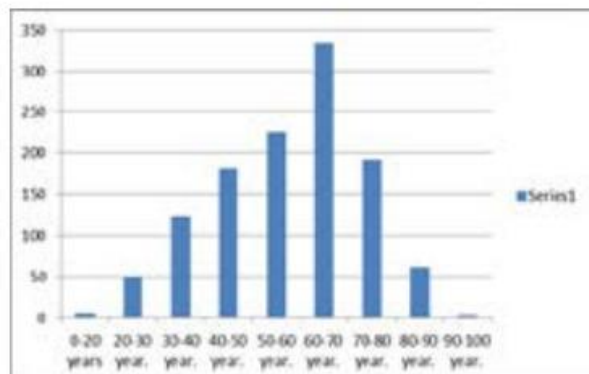
Graph 3A



4. Graph 4A shows the number of COVID-19 patients in age ratio. (Graph 4A)

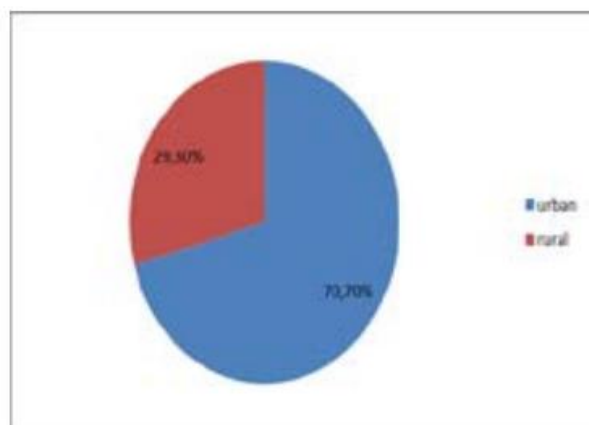
Graph 4A ( number of COVID-19 patients in age ratio):

Graph 4A



5. Graph 5A shows the number of COVID-19 patients with resulting complications with or without severe radiological picture in village/city ratio expressed in percentage.

Graph 5A (number of resulting complications in the lungs of COVID-19 patients in village/city ratio expressed in percentage):

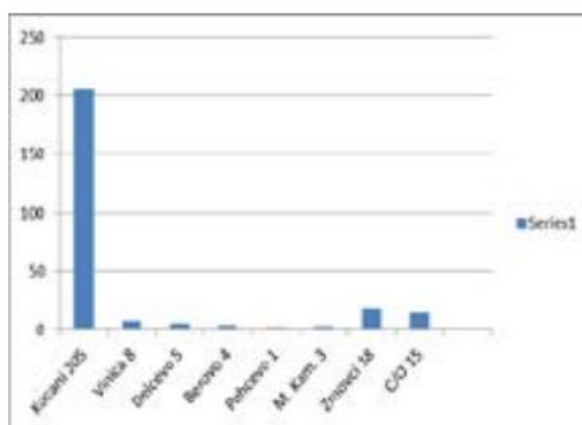


6. Graph 6A shows the number of patients with resulting complications in the lungs expressed in municipalities ratio from the east part of the country which were included in the research.

One sporadic case each from Skopje and Radovish with resulting complications in the lungs and severe X-ray picture. (Graph 6A)

Graph 6A (number of resulting complications in the lungs of COVID-19 patients shown in municipality ratio):

Graph 6A

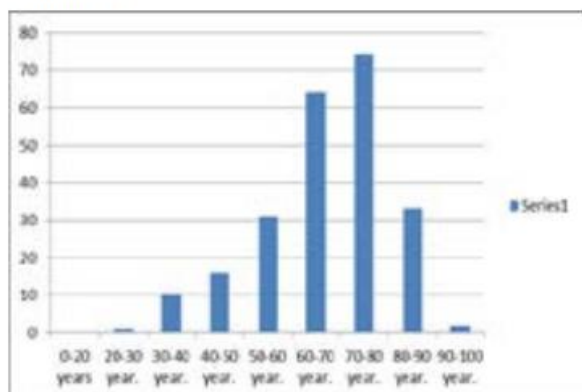


7. The number of resulting complications in the lungs of COVID-19 patients shown in age group ratio. Graph 7

The most common complications among these patients are pneumonia, pleuropneumonia and pleural effusion.

Graph 7A (number of resulting complications of COVID-19 patients shown in age group ratio):

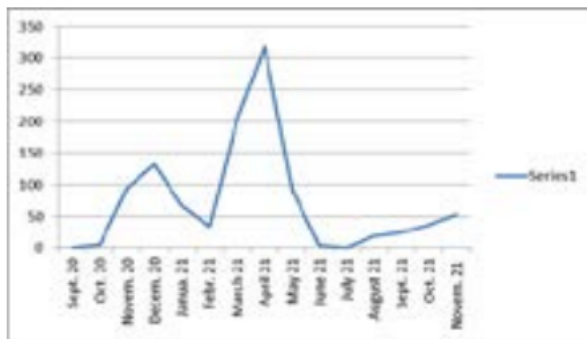
Graph 7A



8. Number of COVID-19 patients who have done an X-ray in PHI - Kochani in the period between September 2020-November 2021 shown in months ratio. (Graph 8A)

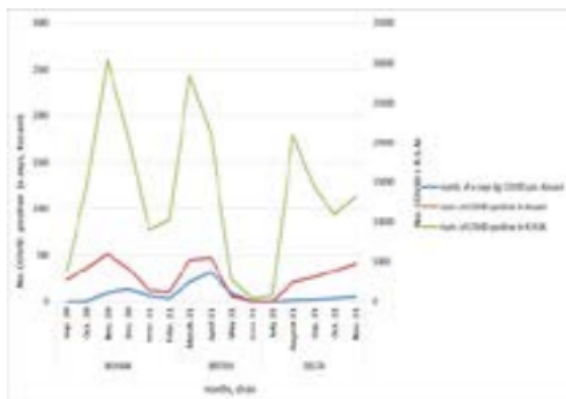
Graph 8A (number of COVID-19 patients shown in months ratio):

Graph 8A



9. Comparison and graphic display of the number of COVID-19 patients in Republic of North Macedonia, municipality of Kochani and COVID-19 X-ray diagnosed patients in the PHI with extended activity- Kochani. (Graph 9A)

Graph 9A (graphic comparison of the numebr of COVID-19 patients in RNM, municipality of Kochani and patients diagnosed in PHI with extended activity- Kochani, in the specified period):



**CONCLUSION**

The analysis have shown that among the patients of the first group:

- a) The percentage of COVID-19 patients is higher in the urban areas with 79.2%, as a result of the density in population and therefore higher transmission of the disease..
- b) The highest number of patients registered are from the municipalities: Kochani - 911, Cheshinovo-Obleshevo-64, Zrnovci-51. The lowest number of COVID-19 patients in the region is from Pehchevo-1, M.Kamenica-5.

Sporadic cases have been registered from other

municipalities of the country.

- c) The male population dominates among the COVID-19 patients instead of the female.
- d) The age group 60-70 years old dominates and it is followed by the 50-60 years old age group. The lowest number of tested patients are the ones who belong to the 0-20 age group and the elderly from 90-100 years old.
- e) The higher number of patients with resulting complications in the researched region is found in the urban areas with 70.7% as a result of the higher population which causes higher transmission of the disease, the air pollution.
- f) The highest number of resulting complications in the lungs is registered in the city of Kochani with 205 registered cases (22.5%) and in the municipality of Zrnovci with 18 registered cases (35%).

g) The resulting complications are most common in the age group 70-80 years old, which is followed by the 60-70 years old age group. The lowest number is in the age groups that had the least cases of COVID-19 patients.

h) When comparing Graph 2A with Graph 6A we notice that the higher number of patients with resulting complications dominates in the rural areas with the highest number noticed in Zrnovci with 35%.

Factors that may possibly contribute to the higher percentage of resulting complications in rural areas are: the lower awareness of the severity of COVID-19 disease, greater propensity for treatment at home i.e. avoiding hospital treatment,

the lack of capacity to assess the deterioration in the clinical picture of the sick patients which results in seeking medical help at a later stage,

the distance from hospitals.

- i) For the specified research period during the pandemics, whose data is shown in Graph 8A, we can clearly see three waves of disease intensification with highest peak in the month of April 2021.
- j) According to Graph 9A there are three waves of disease intensification, which are almost identical and were caused by the three types of the virus: Vuhan, British and Delta in the specified period.

**RESULTS (B)**

Application of the basic statistical analysis of the demographic data of the second group of patients (Group B). This is the group of patients who had negative or nonconclusive PCR results, but still had atypical and distinctive radiological picture same like the COVID-19 patients.

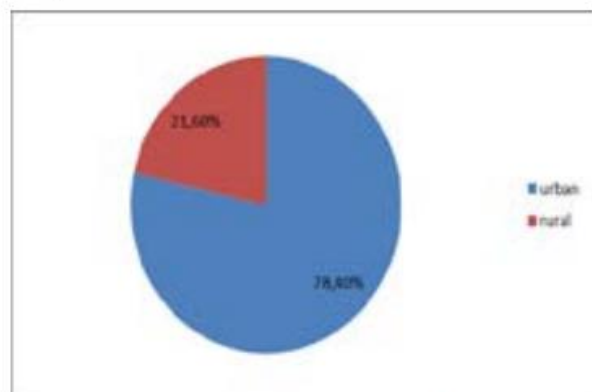
Graph 1B shows the number of unconfirmed patients during PCR in village/city ratio expressed in percentage. (Graph 1B).

Total of 78.4% belongs to the urban population, while 21.6% belongs to the rural population.

The highest registered number is from Kochani, which is 106 patients. Zrnovci 5, municipality of Cheshinovo-Obleshevo 12 and one case each from Berovo, M.Kamenica and Probishtip.

Graph 1B (number of suspected COVID-19 patients in village/city ratio expressed in percentage):

Graph 1B

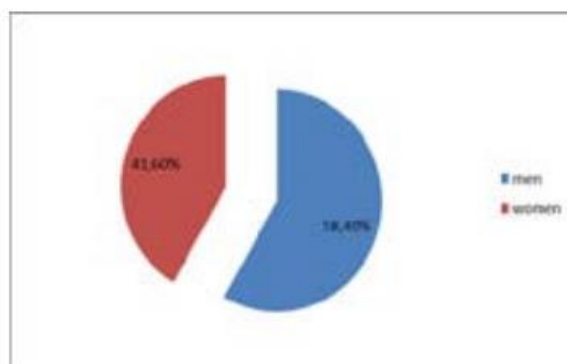


2. In the second group of patients who had negative or non conclusive PCRs, but still showed convincing X-ray image of COVID-19. The clinical picture of COVID-19 dominated among these patients as well as the positive epidemiological anamnesis and most of these people were treated as COVID-19 positive patients.

73 are male and 52 are female patients out of the 125 patients who belong to this group.

Graph 2B ( male/female ratio of suspected COVID-19 patients, expressed in percentage):

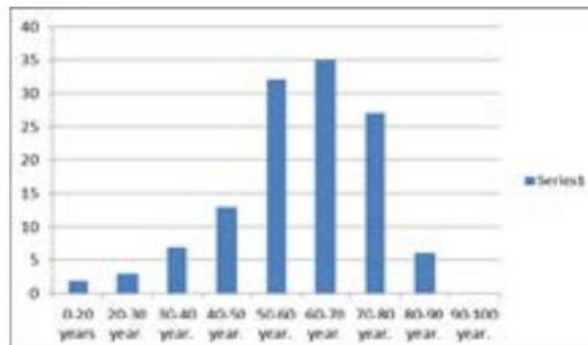
Graph 2B



3. Graph 3B shows the number of unconfirmed COVID-19 patients in age ratio. (Graph 3B).

Graph 3B (number of suspected COVID-19 cases in age ratio):

Graph 3B



**CONCLUSION (B)**

The analysis has shown that among the patients from the second group:

- a) The number of researched patients is higher from the urban areas 78.40%.
- b) The male population of patients dominates (58.40%) in relation to the female.
- c) The patients from 60-70 years old age group dominate, followed by the 50-60 years old age group. The lowest number of tested patients belongs to the 0-20 years old age group.

The demographic characteristics such as gender, age and village/city distribution are almost identical to the first group of tested patients.

## RESULTS (O)

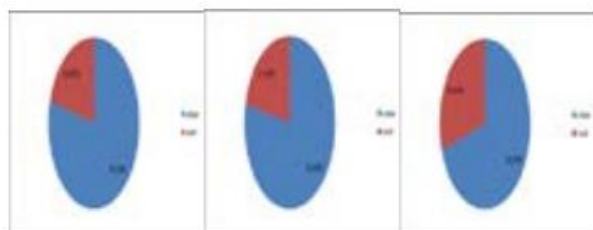
I. Application of the basic statistical analysis of the demographic data of the patients from control Group O - patients encountered during normal work days who showed typical radiological signs of:

- pneumonia (lobar, lobular, interstitial),
- bronchopneumonia,
- pleuritis
- pleuropneumonia.

II. Comparison between A, B and O groups.

1. Comparison of the graphs from A, B and O ( village/town ratio of the tested patients from the A, B and O groups expressed in percentage):

Graph A, Graph B, Graph O

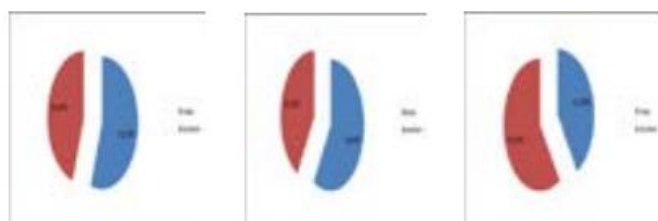


2. In the control group O are patients from everyday work who have other non COVID-19 related lung diseases.

41 are male, while 59 are female in this group, out of 100 tested patients.

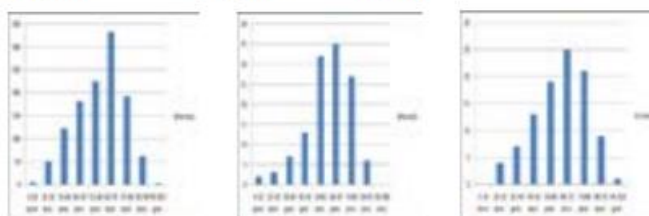
Comparison of the Graphs A, B, O ( tested male/female ratio from the groups A, B, O expressed in percentage):

Graph A, Graph B, Graph O.



3. Comparison of the graphs from A, B and O ( age ratio comparison)

Graph A, Graph B, Graph O.



## DISCUSSION

The reason for higher percentage of COVID-19 male population is probably the higher expression of the receptors of Angiotensin Converting Enzyme 2 - ACE 2) in men, which is actually the entry way of the virus SARS-CoV-2. (Gregor Majdic, 2020)

## CONCLUSION

1. The comparative analysis have shown that:

a) the village/town ratio in the studied groups (A, B and O) is almost identical.

The percentage of sick patients in the urban environment is higher, probably due to:

- the higher population density in the urban areas,
- the air pollution,
- the dynamic lifestyle.

b) There is a difference between the sick male/female percentage among the A, B and O groups:

- the higher number of sick patients from groups A and B is male,
- the higher number of sick patients in group O is female.

c) In all three studied groups, the higher number of COVID-19 patients is among the 60-70 years old age group.

There is no significant difference noticed between the 50-60 years old age group and 70-80 years old age group when compared using the Graphs 3A, 3B and 3O.

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