

Relationship Between Post Covid Symptoms And Its Dependencies Such As Age And Gender

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Abstract—With the advent of the Coronavirus in 2020, our economic and social situations have drastically changed. As a result, rather than finding a way to eradicate the virus, we have made several societal and behavioural changes that dictate us to live along with the virus. Nevertheless, the world is making strides toward creating a cure for Covid. Furthermore, to completely eradicate the virus, we must monitor the patients' symptoms during corona and after they recover (POST-COVID). Again, forming links connecting human components such as ages and gender with Post covid symptoms help us understand the virus to a much greater degree. This survey aims to scrupulously determine the relationship between People of distinct age groups, gender, and the Post Covid symptoms they are exhibiting. The questionnaire deployed had 20 questions that helped us record the Post covid symptoms each person had contracted.

Keywords – Post-Covid symptoms, classification, symptom relationships, dependencies,

I. INTRODUCTION

With the announcement of the pandemic, the societal, behavioural, and economic changes that have occurred in our lives are of no ordinary magnitude. Moreover, with the elevation in the number of cases, the world is forced to take steps to eradicate this virus and restore society to what it was before covid. Though monitoring the patients' symptoms during covid is vital, it is also essential to monitor their symptoms after recuperating from covid. It is crucial to find empirical shreds of evidence linking the post covid symptoms to human factors such as age and gender since it will deepen our understanding of the virus. It will also give a basic idea of the various functionalities and dependencies required by the virus to manifest specific symptoms within patients.

Although people's post covid symptoms depend on several factors, age and gender seem to be the most significant. This is because these components provide us with valuable information about the state of the patient's body. Consequently, we can construct an effective healthcare plan for a person combating severe Post covid symptoms based on age and gender. Social factors in correlation with age and gender also play an integral role in determining the types of post covid symptoms experienced by a person. For instance, the age group and the gender that had the most exposure to the outdoor environment due to social obligations such as work can be concluded to be the most affected.

The common variants of Post covid symptoms affect various systems, ranging from the respiratory to the excretory. Also, the post covid symptoms differ in magnitude ranging from a simple fever to something complex like persistent anosmia. Some well-known Post covid symptoms are fever and chills, body aches, sore throat, shortness of breath, headaches, nausea, vomiting, diarrhoea, constipation, etc. In contrast, some obsolete Post covid symptoms are persistent anosmia, persistent ageusia, skin discolouration, hair loss, etc. Apart from this, there are also speculations about the Coronavirus amplifying the underlying health conditions of a person. Not to mention, assumptions about coronavirus affecting the fatigue levels one feels after covid compared to before covid.

Ergo, this study aims to assess the presence of a connection between age, gender, and the post covid symptoms exhibited by various people within the geographical confines of India. Also, to speculate and determine the most prevalent and the minor Post covid symptoms according to age group and gender, respectively. Subsequently, we can achieve a much extensive understanding of the virus through constructing links between the human factors and the pathogen.

II. METHOD

This survey was conducted entirely via the internet with the help of google forms. In addition, the survey was delivered to the respondents using a wide array of social media platforms. Furthermore, the survey was constructed under the cross-sectional researching model to record the various Post-Covid symptoms carefully. Thereby leading to the assessment of the relationships between the post covid symptoms exhibited by a patient and other human factors like age and gender. Two students from Tbilisi State Medical University designed the questions. The survey established the respondents' consent. It was mentioned in the survey instructions that when a participant starts filling the questionnaire, it is considered that they were taking part in the study with their complete and utmost consent. The survey had 20 questions, separated into three distinct parts. The survey recorded the credentials of the person in the first part. Additionally, the first part also confirmed whether the person had contracted Corona or not. The survey also explored if that person had recovered from corona in the last six months or not. Then, the second part of the survey encapsulated the questions intended to record the Post covid symptoms and the possibility of the person having an underlying condition like hypertension, diabetes, heart failure, etc. Finally, the third part of the survey contained the question that evaluated if there were any changes in the intensity of the underlying condition.

The questionnaire contained the following questions.

Part-1

- 1) Name (FULL NAME)
- 2) Age Group
- 3) Country of residence (where u live currently)
- 4) Gender
- 5) Did you have COVID-19?
- 6) Did you recover from Covid within the last six months? (conditional)

Part-2 (if yes)

- 7) Did you come down with fevers and chills
- 8) After recovering from COVID, were you experiencing body aches?
- 9) Have you been afflicted by a sore throat?
- 10) Did you experience hair loss?
- 11) Did you suffer from shortness of breath or a heavy chest?
- 12) Did intermittent headaches incapacitate you?
- 13) Did you suffer from nausea or vomiting?
- 14) Did you exhibit any symptoms of diarrhoea or constipation?
- 15) Were you afflicted with any form of skin discolouration or rash?
- 16) After recovering from COVID, do you get tired quicker compared to before COVID?
- 17) Did you experience any persistent anosmia (loss of smell)?
- 18) Were you affected by persistent ageusia (loss of taste)?
- 19) Do you have an underlying health condition of any kind? (conditional)

Part-3(if yes)

20) Has the intensity of your underlying condition increased in magnitude?

The prevalent question type in the survey was the yes / no model. And, almost all the questions except the credential questions followed this pattern. The survey contained three conditional questions (one at the end of each part). Depending on the respondent's answer, the survey would progress into the next section or automatically end by submitting the response. Furthermore, this method was employed to ensure the recording of the responses in a more orderly function.

III. RESULTS

The data analysis was done with the aid of google sheets, soscistatics.com and quantpsy.org. Percentages were calculated for all the relevant and critical questions.

Two chi-square analyses were conducted. One was to examine the relationship between the people who had post covid symptoms and the biological gender of the participants. Another one was to investigate the integrity of the relationship between the people who had post covid symptoms and different age groups of the respondents. In both cases, the results were significant as the two-tailed p-values were <0.05 .

A total of 305 responses were received with the consent of the respondents. And, the majority of the respondents were males, 63.6% (n-194).

Figures 1(a.1), 1(a.2), 1(b.1), 1(b.2), 1(c.1), and 1(c.2) provides descriptive information about the respondents

Figure 1(a.1) Illustration of the respondents' gender (out of the people who had POST Covid symptoms).

GENDER	NUMBER	PERCENTAGE
FEMALE	110	36.1%
MALE	194	63.6%
OTHER	1	0.3%
GRAND TOTAL	305	100%

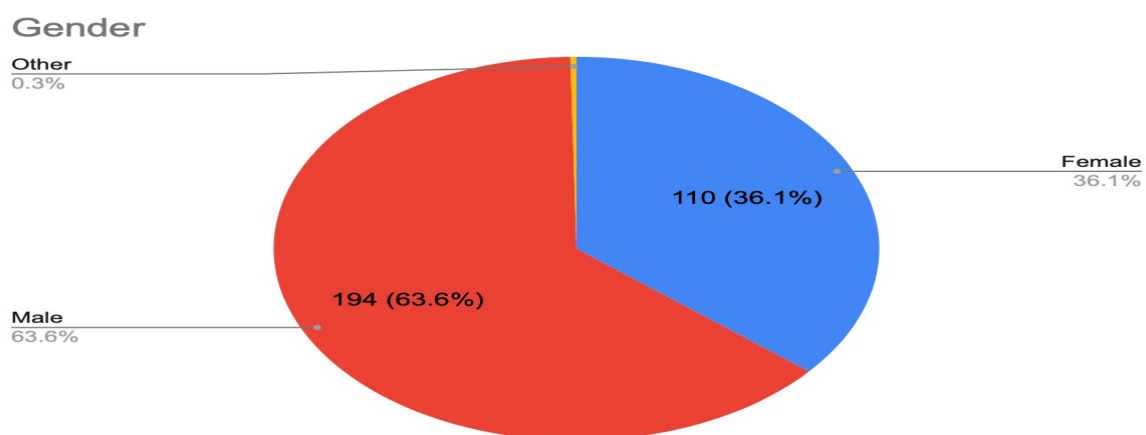


Figure 1(a.2) Illustration of the respondents' gender (out of the people who had POST Covid symptoms).

The figures show that most of the respondents who had POST covid symptoms were male, with 63.6% (n - 194). Female and the other gender respondents are responsible for 36.1% (n- 110) and 0.3% (n-1) of the total recorded responses.

Table 1(b.1) Illustration of the Respondents' age (out of the respondent who had POST covid symptoms).

AGE GROUP	NUMBER	PERCENTAGE
0-10	3	3%
11-20	100	32.8%
21-30	86	28.2%
31-40	42	13.8%
41-50	49	16.1%
51-60	16	5.2%
>60	9	3%
GRAND TOTAL	305	100%

The statistics express that predominantly, the 11 to 20 age group has responded more than any other age group with 32.8% (n-100) of the total responses. The age groups between 21-30 with 28.2% (n-86) and 41-50 with 16.1% (n-49) hold the second and third positions, respectively. The age group with the least number of respondents happens to be 0 - 10 with 0.9% (n-3).

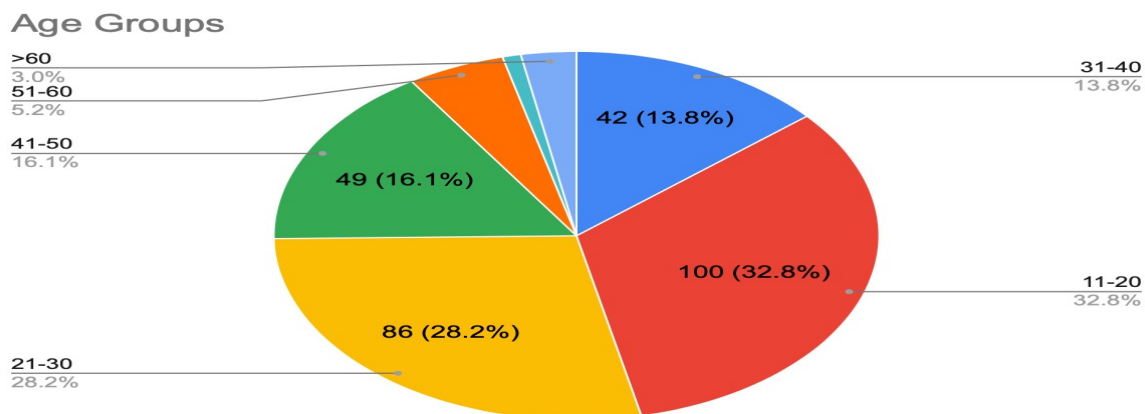


Figure 1(b.2) Illustration of the Respondents' age (out of the respondent who had POST covid symptoms).

Table 1(c.1) Illustrates the Respondents who had POST covid symptoms.

PARTICIPANTS	NUMBER	PERCENTAGE
NO	163	34.8%
YES	305	65.2%
GRAND TOTAL	468	100%

Did you have COVID-19?

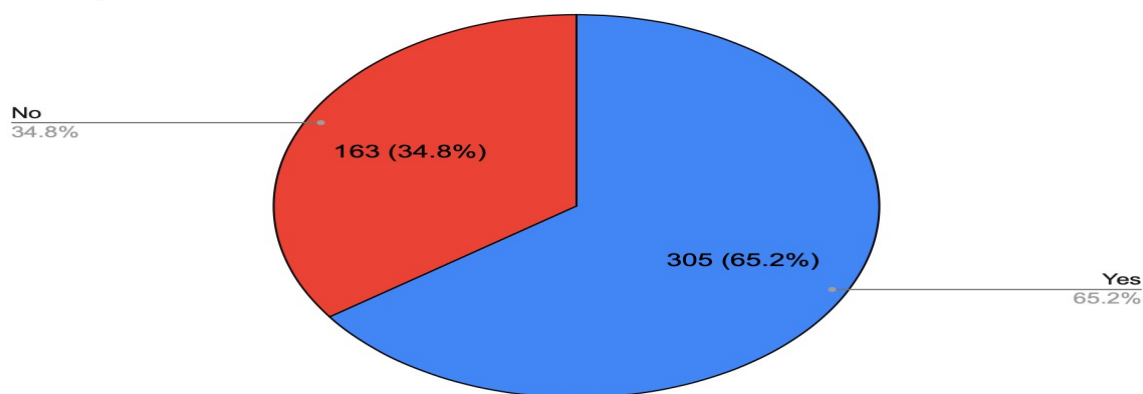


Figure 1(c.2) Illustrates the Respondents who had POST covid symptoms.

These figures clearly illustrate that 65.2% (n- 305) exhibited POST covid symptoms out of the total responses. Alternatively, almost 34.8% (n-163) of the respondents did not show any POST covid symptoms.

Figures 2(a.1), 2(a.2), 2(b.1), 2(b.2), 2(c.1), 2(c.2), express the various symptoms in general and also based on different age groups and gender.

Figure 2(a.1) depicts the various POST covid symptoms in general

SYMPTOMS	NUMBER	PERCENTAGE
fever and chills	216	14.1%
body aches	160	10.5%
sore throat	170	11.1%
hair loss	84	5.5%
shortness of breath	135	8.8%

headaches	173	11.3%
nausea or vomiting	100	6.5%
diarrhoea or constipation	104	6.8%
rash or discolouration	47	3.1%
anosmia	171	11.2%
ageusia	170	11.1%
GRAND TOTAL	1530	100%

Most common symptom (general)

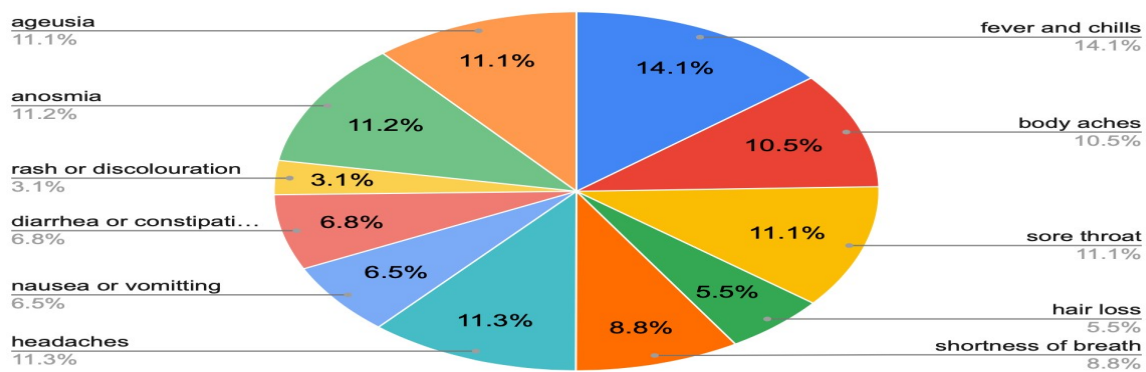


Figure 2(a.2) depicts the various POST covid symptoms in general.

The graphs above delineate the various Post covid symptoms experienced by the respondents. Upon close evaluation, it is evident that the most common symptom experienced by the respondent is fever and chills, with 14.1% (n-216). The predominant symptom next to fever and chills is headaches, with 11.3% (n-173) of responses. It is also worth noting that despite headaches being the second most prevalent symptom, only a minute difference exists between headaches and the number of responses for anosmia, with 11.2% (n-171). Additionally, by a small margin, the third most common symptom among the respondents are persistent ageusia and sore throat, both having 11.1% (n-170). The least common symptom reported by the respondents is rash or discolouration, with 3.1% (n-47). Next to rash or discolouration, hair loss with 5.5% (n-84) of responses is also a lesser common symptom.

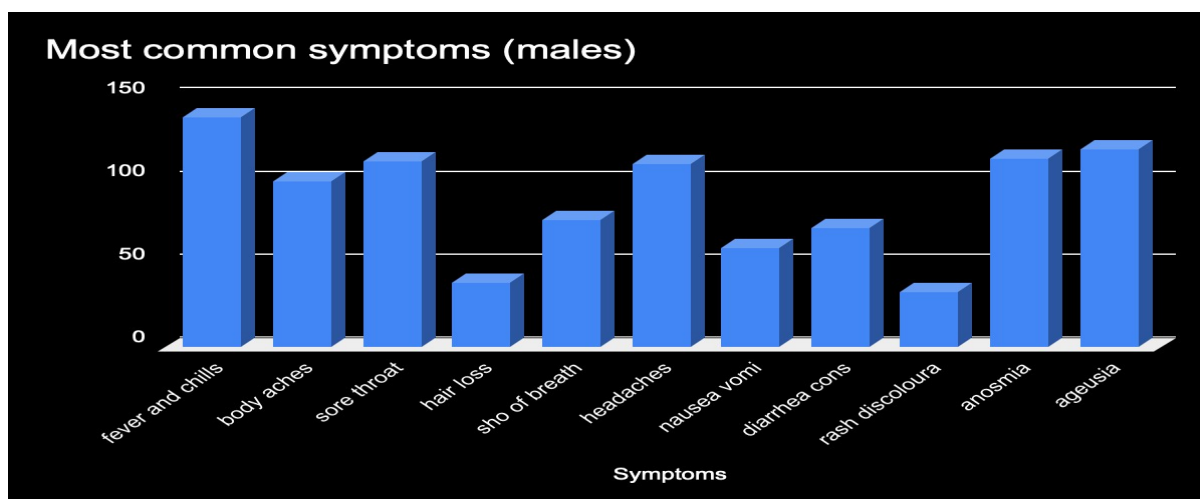


Figure 3(a.1) intimates the POST covid symptoms among the male respondents

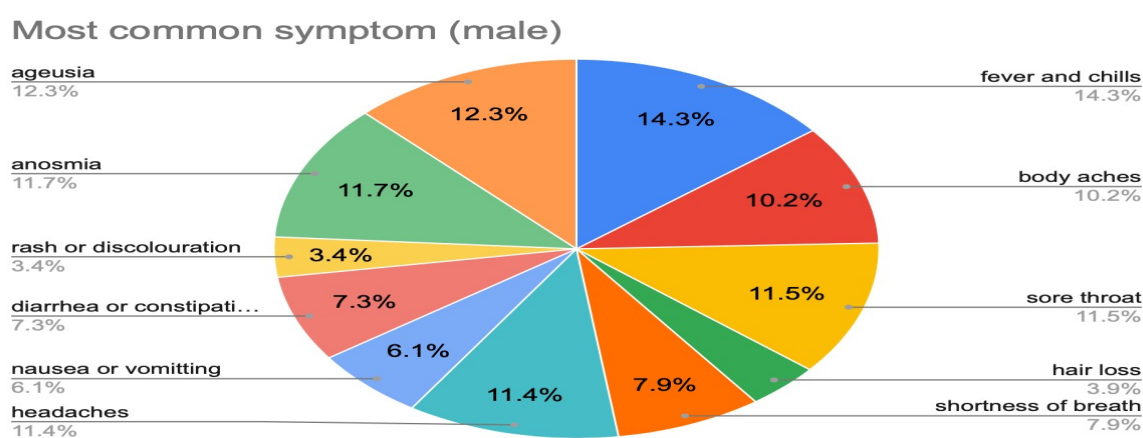


Figure 3(a.2) intimates the POST covid symptoms among the male respondents of the study.

Figures 3(a.1), 3(a.2), 3(b.1), 3(b.2) express the various POST covid symptoms based on different genders.

From evaluating the graphs, fever and chills, which procured 14.3% (n-138) of the responses, are the most common post covid symptoms among the male respondents. Persistent ageusia with 12.3% (n-119) follows fever and chills as the second most common symptom among the male respondents. Following persistent ageusia, persistent anosmia with 11.7 % (n-113) is the third most common symptom experienced by the male respondents of this study. On the other hand, rash and discolouration with 3.4% (n - 33) is the least experienced symptom, followed by hair loss with 3.9% (n-38).

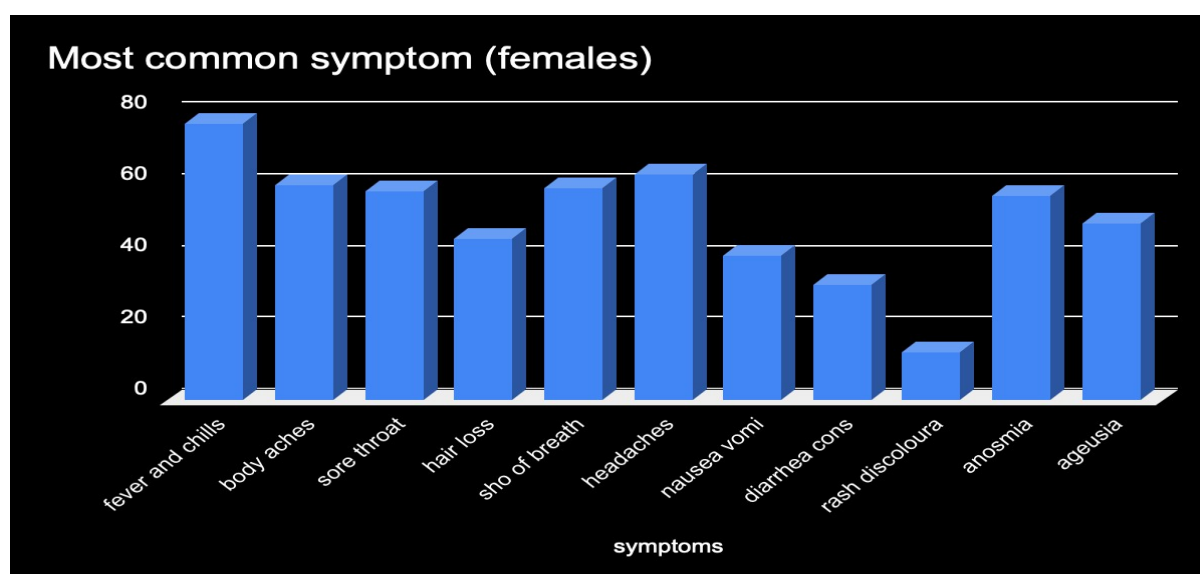


Figure 3(b.1) depicts the POST covid symptoms among the female respondents.

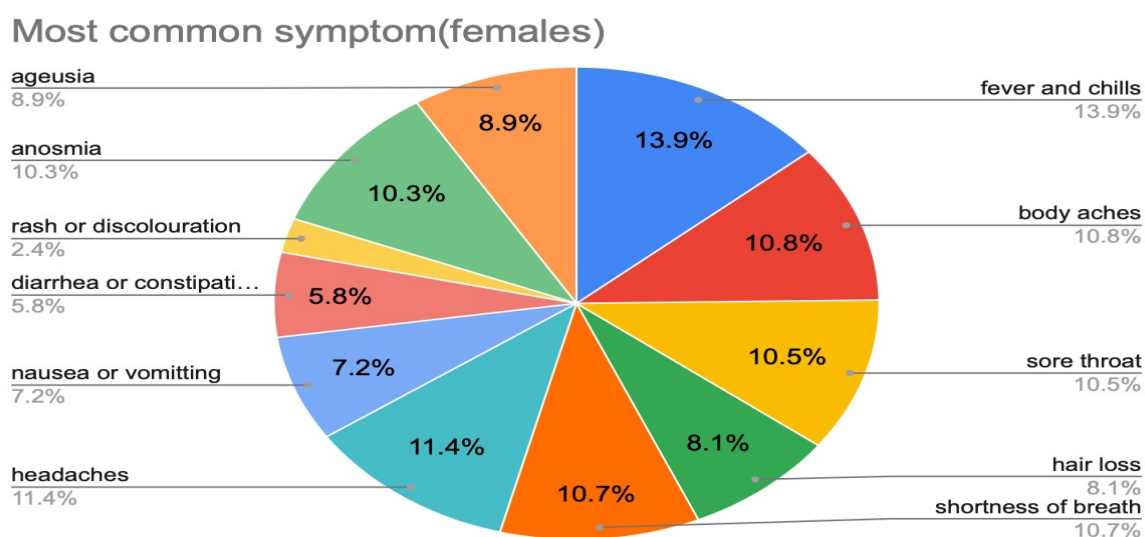
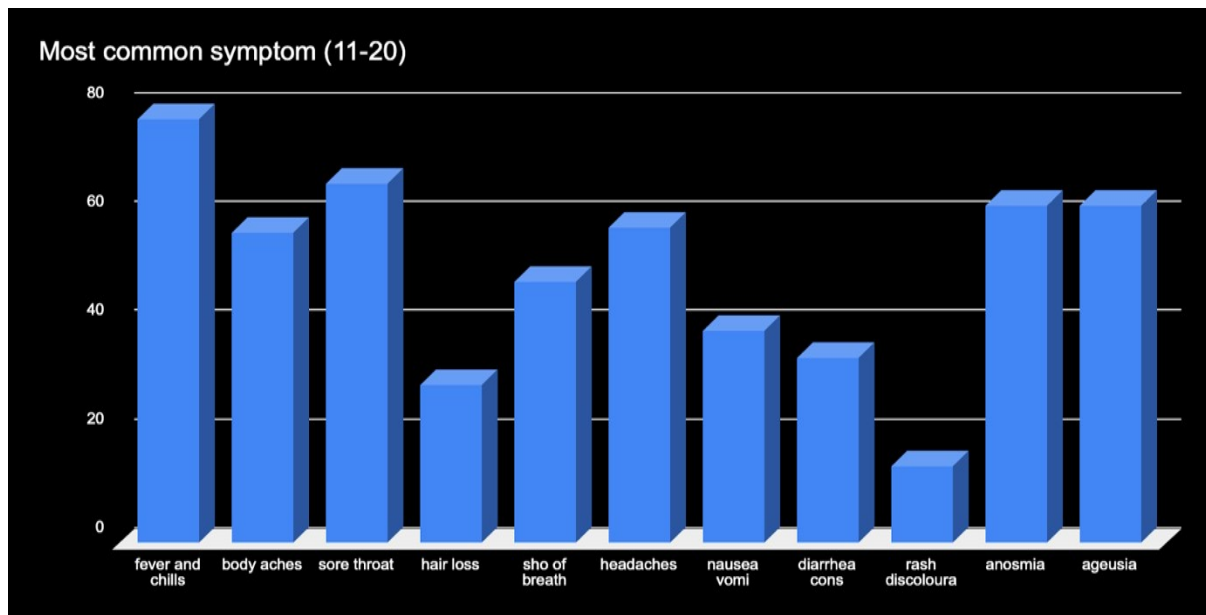


Figure 3(b.2) depicts the POST covid symptoms among the female respondents of the study.

According to the given data, fever and chills with 13.9% (n=77) are the most experienced symptom out of all the other POST covid symptoms. Though it is a small margin between the second and the third most exhibited symptoms, body aches procure the second place with a response rate of 10.8% (n=60) followed by shortness of breath and heavy chest, both having 10.7% (n=59) of the responses. However, the least common symptom exhibited by the students appears to be rash or discoloration, which holds 2.4% (n=13) of the reactions followed by diarrhoea or constipation with 5.8% (n=32) of the female responses.



Figures 4(a.1), 4(a.2),4(b.1),4(b.2),4(c.1),4(c.2),4(d.1),4(d.2) expresses the various POST covid symptoms on different age groups.

Most common symptoms (11-20)

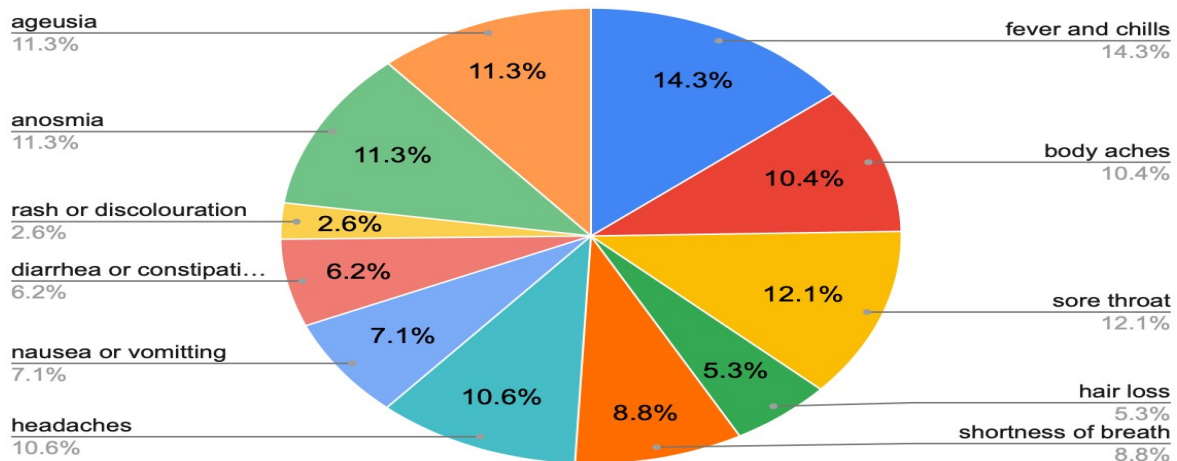


Figure 4(a.2) illustrates the various Post covid symptoms experienced by respondents between 11-20 years of age.

After studying the graphs, it is apparent that fever and chills with 14.3% (n=78) are the most widespread symptom exhibited by the respondents of the 11-20 age group. Subsequently, sore throat with 12.1% (n=66) is the second most experienced post covid symptom next to fever and chills. Also, persistent ageusia and persistent anosmia with 11.3% (n=62) is the third widespread symptom reported by the respondents of this age group. Rash and discolouration with 2.6% (n=14) is the least experienced symptom in this age group, followed by hair loss with a response rate of 5.3% (n=29).

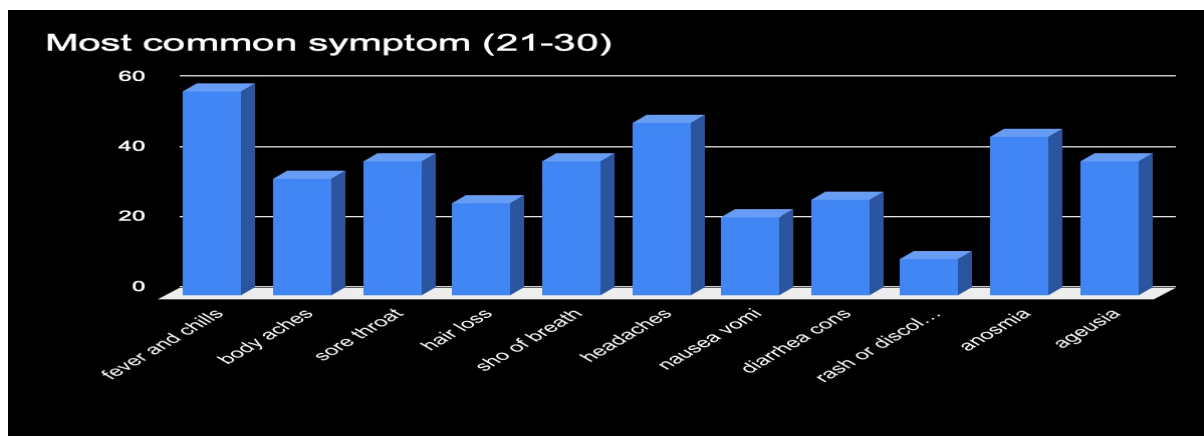


Figure 4(b.1) illustrates the various Post covid symptoms experienced by respondents between 21-30 years of age.

Most common symptoms (21-30)

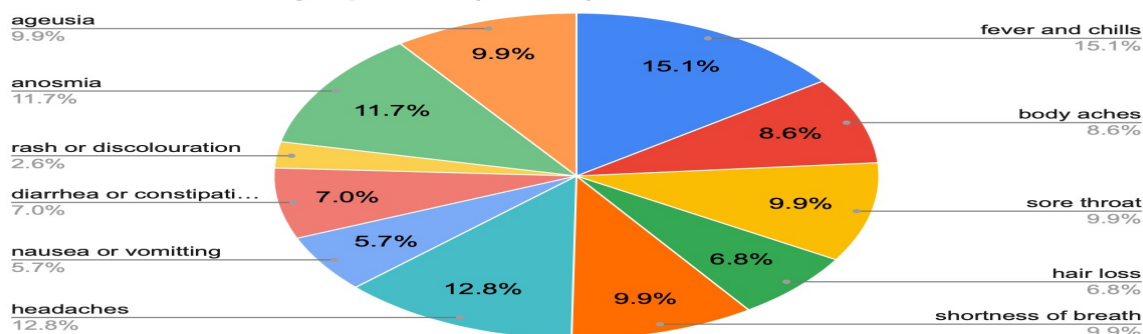


Figure 4(b.2) illustrates the various Post covid symptoms experienced by respondents between 21-30 years of age.

The three symptoms with the highest response rate among the respondents of this age group are fever and chills with 15.1% (n-58), headaches with 12.8 % (n- 49), and persistent anosmia with 11.7% (n-45). In this age group, out of all the other POST covid symptoms, rash and discoloration possess the lowest response rate with 2.6% (n-10). Nausea or vomiting with 5.7% (n-22) is the least experienced symptom next to fever and chills.

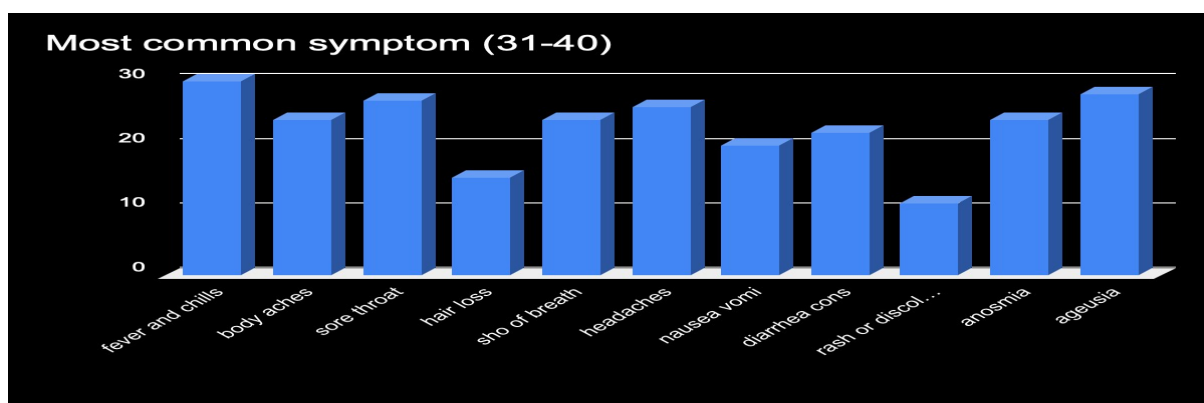


Figure 4(c.1) illustrates the various Post covid symptoms experienced by respondents between 31-40 years of age.

The most common symptoms (31-40)

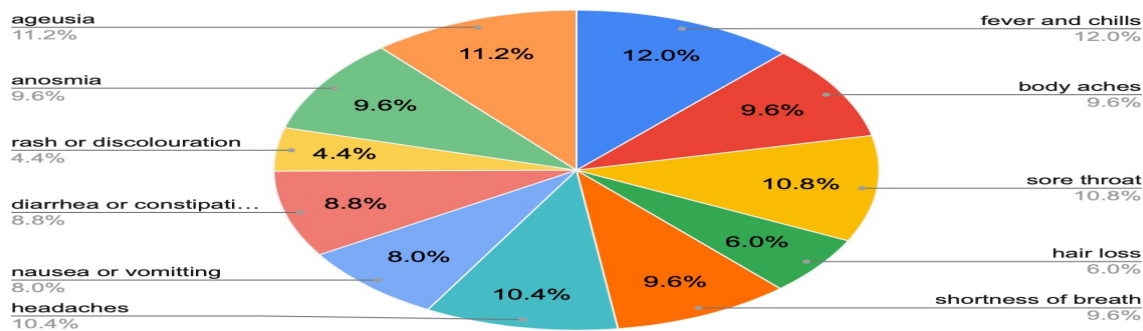


Figure 4(c.2) illustrates the various Post covid symptoms experienced by respondents between 31-40 years of age.

Among the respondents of this age group, Fever and chills are the most prevailing symptom, with 12%. Persistent ageusia and sore throat hold the second and the third position for the most experienced symptom with a response rate of 11.2% (n=28) and 10.8% (n=27), respectively. On the other hand, rash and discolouration with 4.4% (n=11) is the symptom with the least amount of responses, followed by hair loss with 6.0% (n=15).

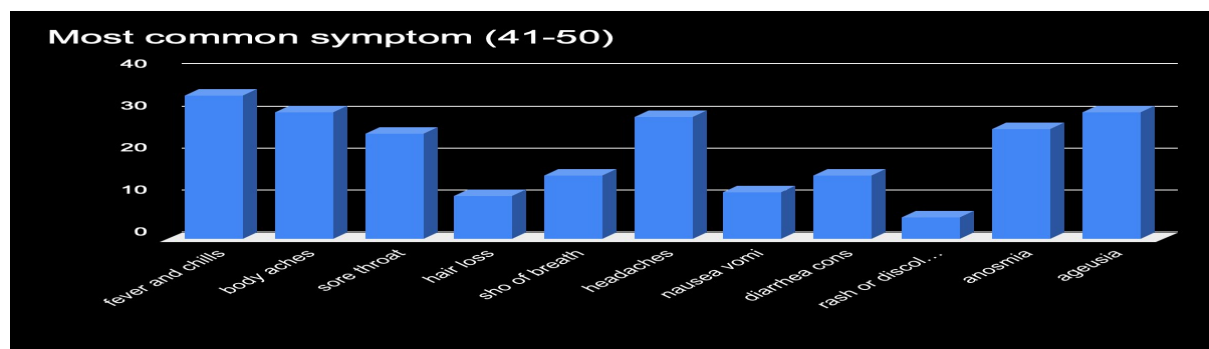


Figure 4(d.1) illustrates the various Post covid symptoms experienced by respondents between 41-50 years of age.

Most common symptoms (41-50)

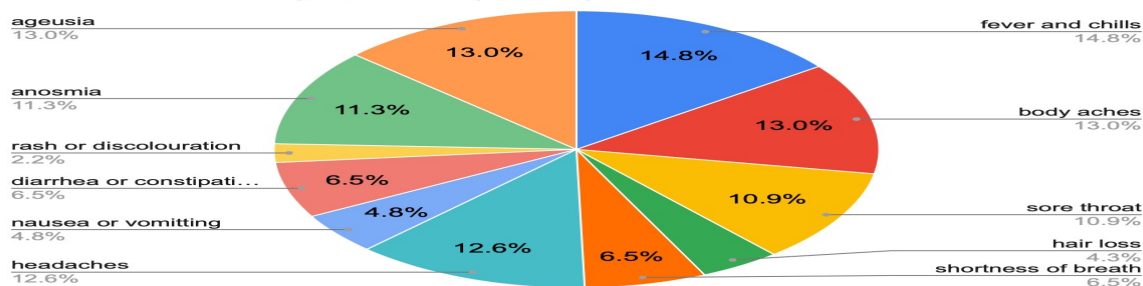


Figure 4(d.2) illustrates the various Post covid symptoms experienced by respondents between 41-50 years of age.

This data gives information about the symptoms shown by the respondents between the ages of 41 and 50. Among the respondents of this age group, with 14.8% (n=34), fever and chills are the Post covid symptoms with the most traction. In this aspect, both ageusia and body ache with 13% (n=30) and headaches with 12.6% (n=29) hold the second and the third position for the most ubiquitous symptoms, respectively. Holding 4.3% (n=10), hair loss contains the smallest number of responses next to rash or discolouration with 2.2% (n=5).

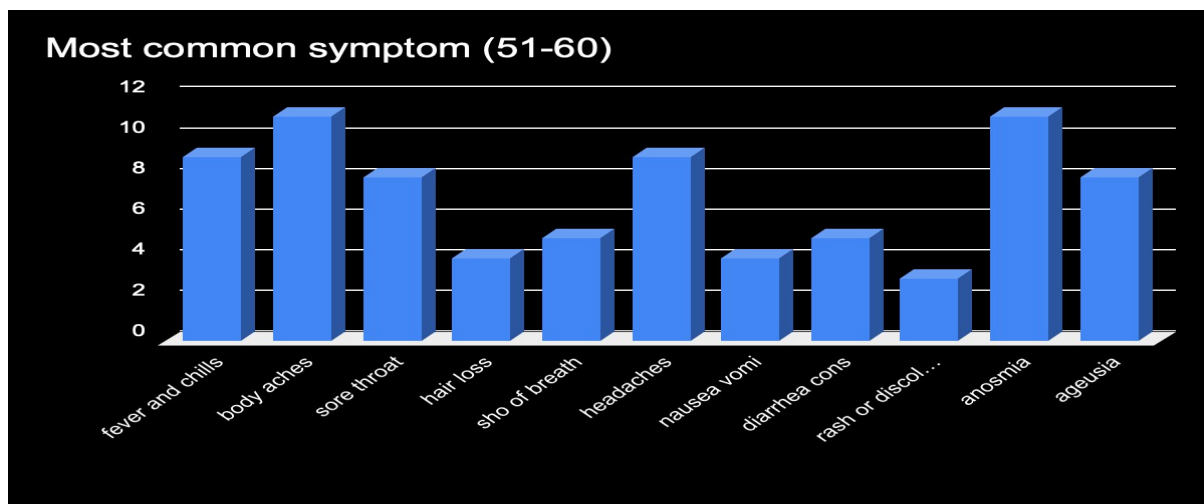


Figure 4(e.1) illustrates the various Post covid symptoms experienced by respondents between 51-60 years of age.

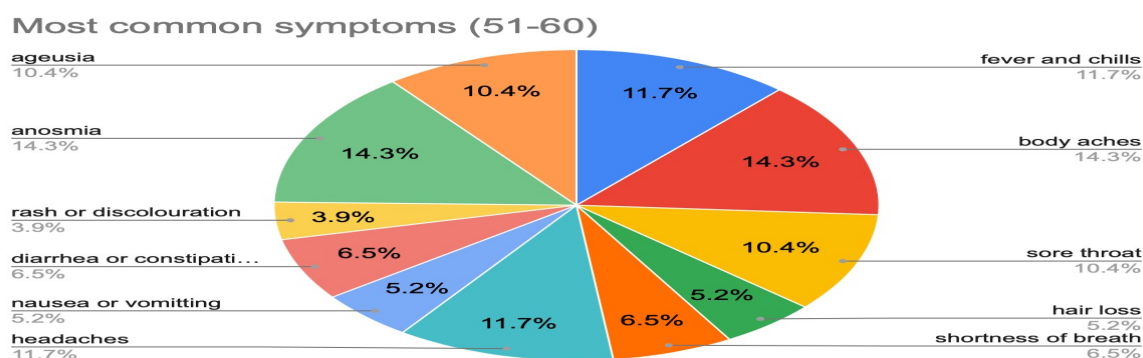


Figure 4(e.2) illustrates the various Post covid symptoms experienced by respondents between 51-60 years of age.

The figures show that the respondents aged between 51 and 60 have predominantly contracted body aches and persistent anosmia with 14.3% (n=11). The recorded responses show that next to persistent anosmia and body ache, the respondents have prevalently experienced headaches and fever with a proportion of 11.7% (n=9). Alternatively, the least exhibited symptom in this age group is rash or discolouration with 3.9% (n=3), followed by hair loss and nausea or vomiting with a response rate of 5.2% (n=4).

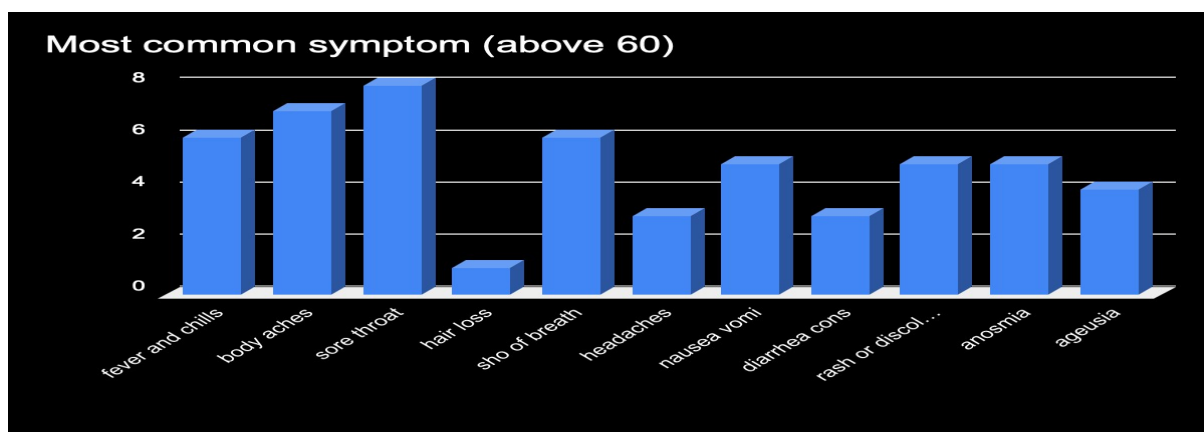


Figure 4(f.1) illustrates the various Post covid symptoms experienced by respondents above 60 years of age.

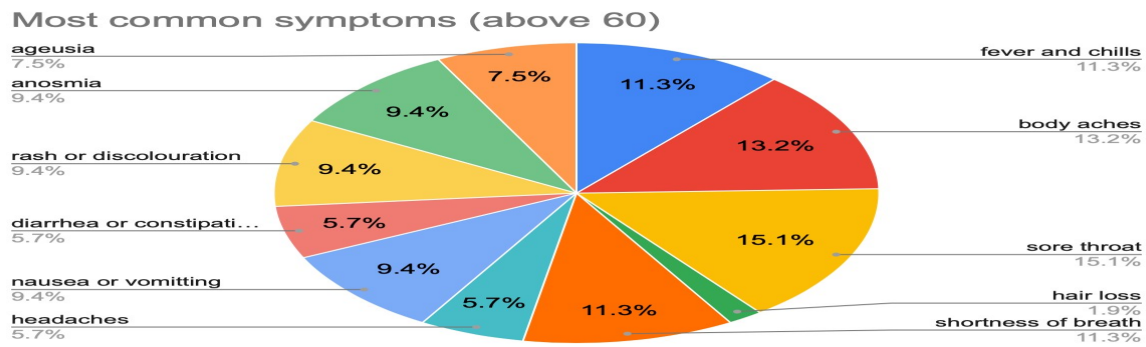


Figure 4(f.2) illustrates the various Post covid symptoms experienced by respondents above 60 years of age.

From this demographic, It is apparent that among the respondents above 60 years of age, sore throat is the most commonly exhibited symptom with 15.1% (n=8). Following sore throat, body aches procure the second place with 13.2% (n=7). And, shortness of breath and fever hold the third position regarding the number of respondents with 11.3% (n=6). In this age group, it is patent that the least experienced symptom is hair loss with 1.9% (n=1) followed by headaches and diarrhoea or constipation, with both having a response percentage of 5.7% (n=3).

IV. DISCUSSION

Figures 5(a) and 6(a) show magnitudes of underlying conditions over different age groups and gender.

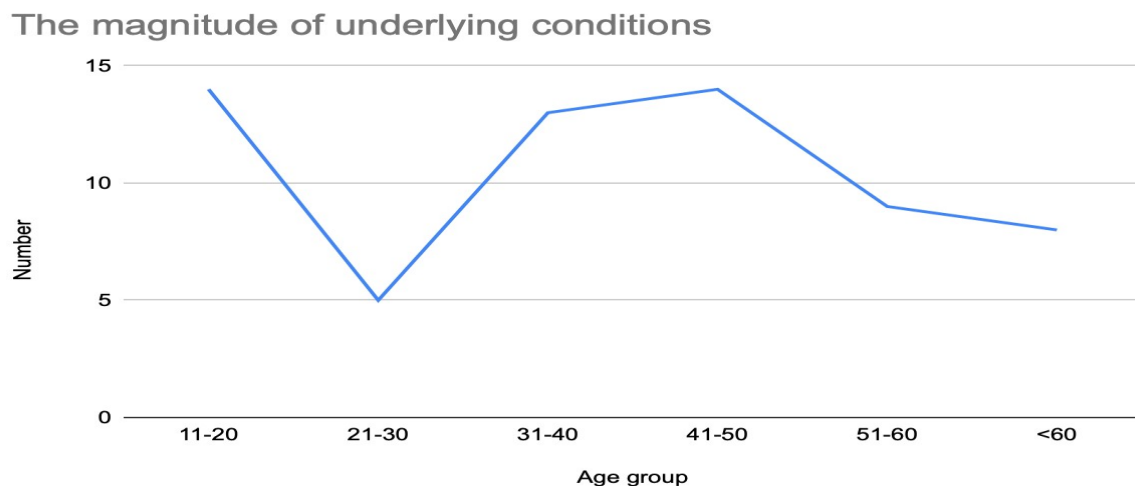


Figure 5(a) shows magnitudes of underlying conditions over different age groups.

When considering the magnitude of underlying conditions over different age groups, the peak of the line graph is at the 41-50 age group. There is an upward spike from the 21-30 age group to 41-50 in the number of people who have a pre-existing condition. Still, there is a moderate downward slope in the numbers from 41-50 to above 60. The age group with the least amount of responses is 21-30. To summarise, the frequency of the underlying diseases is constantly fluctuating, with the highest point at the 41-50 age group and the lowest point at the 21-30 age groups.

From this graph, we can conclude that the number of respondents with underlying health conditions is relatively identical in adults and teens.

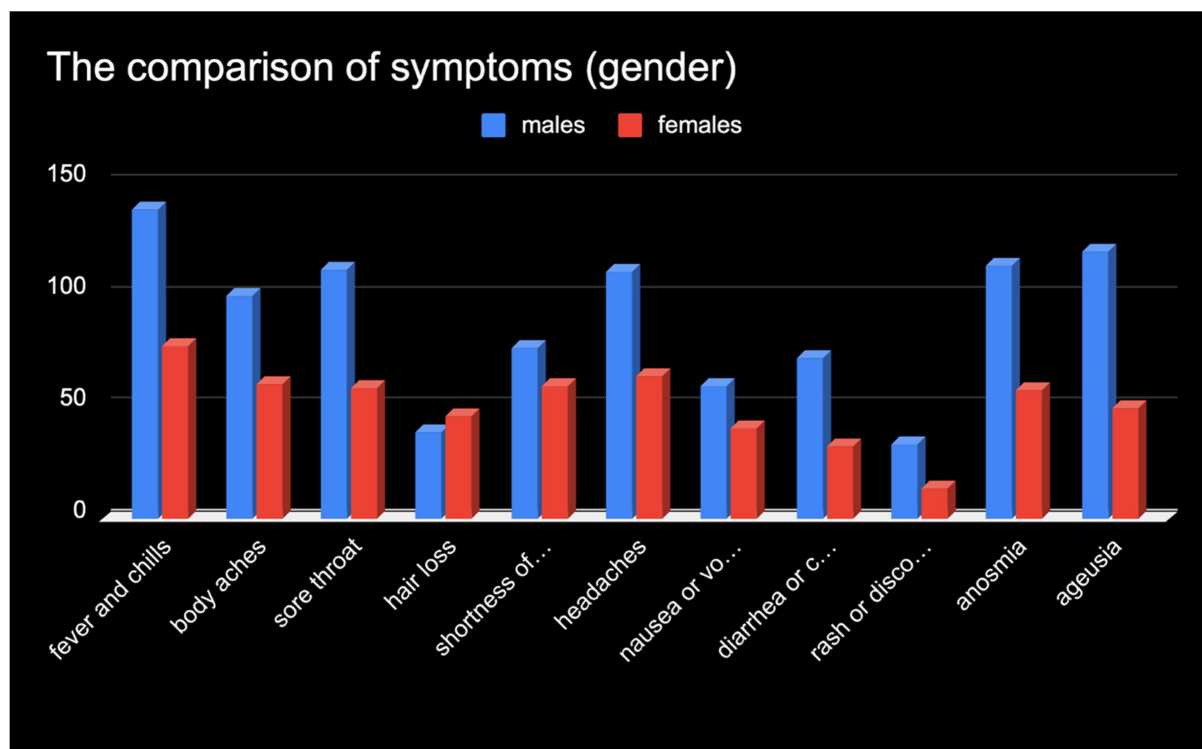


Figure 6(a) shows magnitudes of underlying conditions over different gender.

The bar graph above clearly depicts that fever and chills are the most common symptom, in both genders. However, the symptoms with the most responses next to fever and chills are different for each of the genders. In the case of males, the second most common symptom is ageusia, whereas, in females, it is headaches. Also, anosmia in males and body aches as well as shortness of breath in females can be conferred to be the third most ubiquitous symptom respectively. When comparing the symptoms based on genders, there are a lot of aspects to consider. For instance, the external and internal environmental factors are meant to be considered when speculating the relationships among post covid symptoms. Although for almost all of the symptoms, the number of positive responses of males outnumbers that of females by a wide margin, hair loss is the only symptom where the number of positive reactions for females outnumbers that of males. The symptom with the most minor traction for both males and females is rash or discolouration.

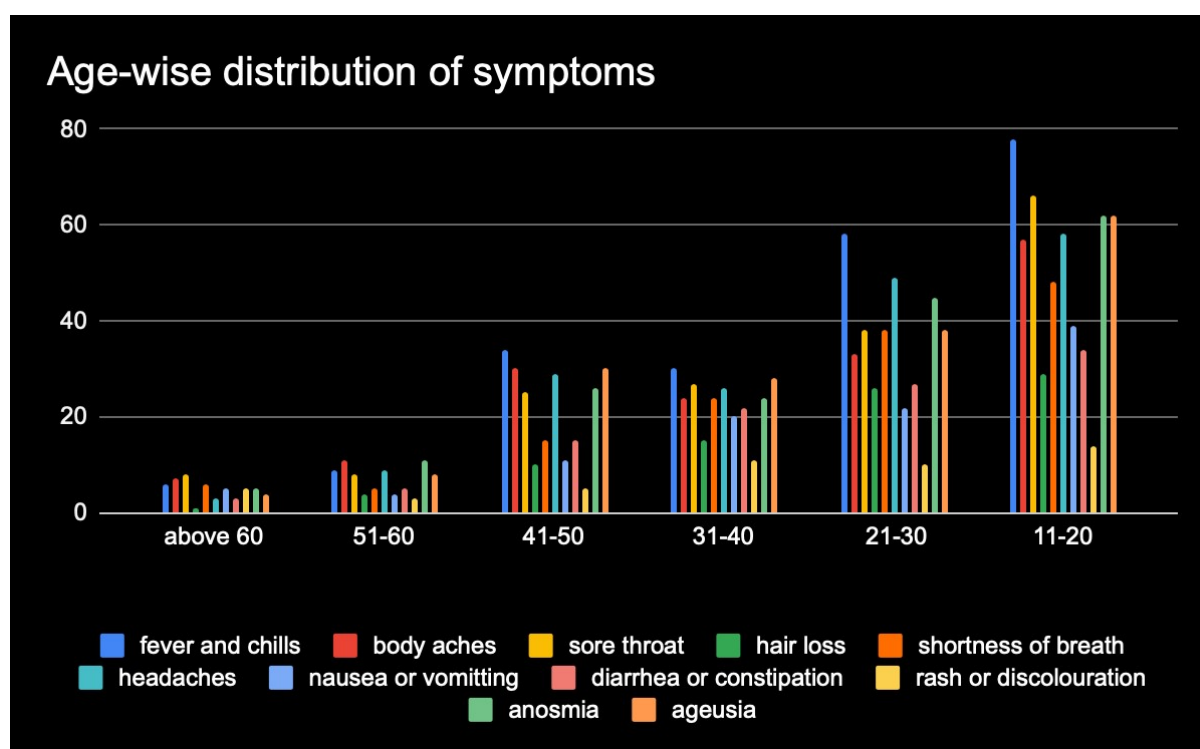


Figure 7(a) shows the age-wise distribution of Post Covid symptoms.

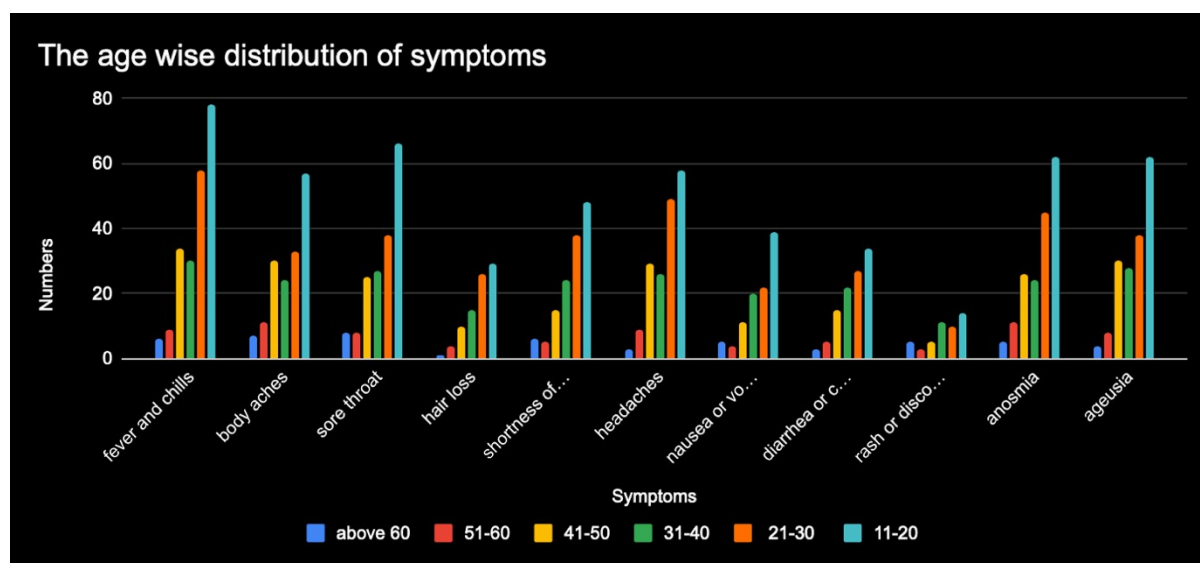


Figure 7(a) shows the age-wise distribution of Post Covid symptoms.

The graph illustrates the crucial relationship between the Post Covid symptoms and the age groups. The respondents of this study can be categorised into six distinct age groups. Out of all the other listed symptoms, Fever and chills are the most common symptoms in four out of the six age groups. In other words, among the respondents of the age 11-50, fever and chills appear to be the most predominant Post Covid symptom. The recorded results for Post Covid symptoms for age groups between 11-50 are relatively similar with minor exceptions. However, the recorded answers of the respondents above 50 are quite different from the answers of the respondents below 50. Above 50 years, the response count for fever and chills declines significantly to the point where it is no longer the most predominant post covid symptom. For the respondents between 51-60, body aches are the most common symptom. Persistent anosmia and persistent ageusia are considerably higher in the respondents above 50 than below 50. The sudden drop in the prominence of specific symptoms like fever and chills in the groups above 50 may be due to the

deterioration of the immune system that accompanies ageing. This trend provides us with discernable and empirical proof of a relationship between the Post covid symptoms exhibited in people and their subsequent age.

V. CONCLUSION:

To summarise, the relationships established between the POST covid symptoms and the human factors such as age groups and gender help find a comprehensive understanding of the virus. Also, construct a fail-proof healthcare plan for the patients experiencing severe post covid symptoms. Alternatively, viewing this from a social perspective, proving the existence of an empirical correlation among the post-Covid symptoms, age groups, and the gender of the patients help us to determine the exact group of most affected people. Consequently, this aids us in designing restrictive measures to mitigate the damage done to the population by the pandemic.

The data collected from this study shows that the connection between the gender ($p = .029449$) and the age groups of the participants who had covid and exhibited POST covid symptoms ($p = .001609$) are significant. This study also gave emphatic answers to several speculation subjects, such as amplifying the underlying health conditions the respondent might have had and amplifying the base fatigue level after recuperating from covid compared to before covid. Apart from this, the study established the most ubiquitous symptom and the least experienced symptom.

This study's main agenda was to determine the precise relationship between age groups, gender, and the Post Covid symptoms respondents exhibit, respectively. Nevertheless, the real intent of this study was to further our understanding of this pandemic from a societal and scientific viewpoint. Furthermore, aiding future generations prepare mitigations for a pandemic of a similar magnitude in the future. Thus, this study functions not only as an esoteric piece of research but also assist us to evolve and adapt ourselves for similar situations in the future.

REFERENCES

- [1] Carfi A, Bernabei R, Landi F, for the Gemelli Against COVID-19 Post-Acute Care Study Group. Persistent Symptoms in Patients After Acute COVID 19. *JAMA*. 2020;324(6):603–605. doi:10.1001/jama.2020.12603
- [2] Docherty AB, Harrison EM, Green CA, Hardwick HE, Pius R, Norman L, Holden KA, Read JM, Dondelinger F, Carson G, Merson L, Lee J, Plotkin D, Sigfrid L, Halpin S, Jackson C, Gamble C, Horby PW, Nguyen-Van-Tam JS, Ho A, Russell CD, Dunning J, Openshaw PJ, Baillie JK, Semple MG; ISARIC4C investigators. Features of 20 133 UK patients in hospital with covid-19 using the ISARIC WHO Clinical Characterisation Protocol: prospective observational cohort study. *BMJ*. 2020 May 22;369:m1985. doi: 10.1136/bmj.m1985. PMID: 32444460; PMCID: PMC7243036.
- [3] Tenenforde MW, et al. Symptom duration and risk factors for delayed return to usual health among outpatients with COVID-19 in a multistate health care systems network — United States, March-June 2020. *MMWR Morbidity and Mortality Weekly Report*. 2020; doi: 10.15585/mmwr.mm6930e1.
- [4] Yancy CW, et al. Coronavirus disease 2019 (COVID-19) and the heart — Is heart failure the next chapter? *JAMA Cardiology*. 2020; doi:10.1001/jamacardio.2020.3575.
- [5] Wang D, Hu B, Hu C, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus–infected pneumonia in Wuhan, China. *JAMA*. 2020;323(13):1239-1242.
- [6] Landi F, Barillaro C, Bellieni A, et al. The new challenge of geriatrics: saving frail older people from the SARS-CoV-2 pandemic infection. *J Nutr Health Aging*. 2020;24(5):466-470. doi: 10.1007/s12603-020-1356-x
- [7] Landi F, Barillaro C, Bellieni A, Brandi V, Carfi A, D'Angelo M, Fusco D, Landi G, Lo Monaco R, Martone AM, Marzetti E, Pagano F, Pais C, Russo A, Salini S, Tosato M, Tummolo A, Benvenuto F, Bramato G, Catalano L, Ciciarello F, Martis I, Rocchi S, Rota E, Salerno A, Tritto M, Sgadari A, Zuccalà G, Bernabei R. The New Challenge of Geriatrics: Saving Frail Older People from the SARS-COV-2 Pandemic Infection. *J Nutr Health Aging*. 2020;24(5):466-470. doi: 10.1007/s12603-020-1356-x. PMID: 32346682; PMCID: PMC7118362.
- [8] Gemelli Against COVID-19 Post-Acute Care Study Group. Post-COVID-19 global health strategies: the need for an interdisciplinary approach. *Aging Clin Exp Res*. 2020 Aug;32(8):1613-1620. doi: 10.1007/s40520-020-01616-x. Epub 2020 Jun 11. PMID: 32529595; PMCID: PMC7287410.

[9] Metlay JP, Fine MJ, Schulz R, Marrie TJ, Coley CM, Kapoor WN, Singer DE. Measuring symptomatic and functional recovery in patients with community-acquired pneumonia. *J Gen Intern Med.* 1997 Jul;12(7):423-30. doi: 10.1046/j.1525-1497.1997.00074.x. PMID: 9229281; PMCID: PMC1497132.