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The impact of COVID-19 disease lockdown on adult Saudi hypertensive patients in Ha'il region, KSA: Cross sectional study

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Abstract---Background: In December 2019, a pandemic emerged from Wuhan, China, caused by a severe acute respiratory syndrome coronavirus 2(SARS COV-2) due to the spread of the COVID-19 pandemic, various governments and health authorities implemented various measures to prevent the spread of the disease. The quarantine was the most effective measure; however, it has a negative effect on chronically diseased patients, especially hypertensive patients. In this study, we aim to explore the impact of the coronavirus disease lockdown on hypertensive patients in Saudi Arabia in terms of their quality of life and routine checkups. Methods: A cross-sectional survey was designed and distributed to 226 patients with hypertension. Data was collected using Google form and then analyzed using SPSS, and A p-value less than 0.05 was considered statistically significant. Results: The study shows correlation between the pandemic and increase stress level among 65.9% of participants. 40.3% of participants reported that the measurements of blood pressure during the pandemic were much higher, and 47.3% of patients refused to visit health care facilities for their regular follow-ups during the lockdown. Also 63% of patients had developed complications from hypertension during the pandemic. Conclusions: The quarantine negatively influences hypertensive patients in terms of their quality of life and routine checkups which led to an increase in

their blood pressure levels and decreased compliance with antihypertension medications and pushed them toward a sedentary lifestyle these factors increased their predisposition of developing complications.

Keywords---COVID-19, hypertension, quarantine, lifestyle.

Introduction

In December 2019, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (COVID-19) emerged from Wuhan, China. Despite the numerous measures taken to control the spread of COVID-19 in China, the viral transmission rate was still high. Therefore, the WHO declared the pandemic COVID-19. ⁽¹⁾ Due to the COVID-19 pandemic's alarming spread, various governments and health authorities have implemented various measures to prevent the disease from spreading. Some of these include travel restrictions, community lockdown, and the restriction of gatherings. ⁽²⁾ On the 2nd of March 2020, the first case of COVID-19 was reported by the Saudi authorities.

Saudi Arabia's Ministry of Health imposed a partial lockdown, and a 24-hour lockdown was also imposed in various cities. ⁽³⁾ Although social distancing and lockdown are considered the most effective ways to combat the pandemic, they can also negatively affect health, social life, and the economy. It can induce anxiety, stress, anger, depression and reduces physical activity. ⁽⁴⁾ In addition, during the early stages of the pandemic, there was widespread media attention on the risk of hypertension, which raised concerns that patients with hypertension were not presenting to primary care physicians for a routine checkup. ⁽⁵⁾

Hypertension is one of the leading causes of mortality and morbidity globally. In Saudi Arabia, hypertension is becoming more prevalent. It is a known risk factor for various chronic diseases. ⁽⁶⁾ In reported COVID-19 cases, approximately 30% of the cases were hypertensive individuals. For that reason, hypertensive patients are concerned about getting infected with the virus, and prefer staying away from the hospital. ⁽⁷⁾ In this study, we aim to explore the impact of the coronavirus disease lockdown on hypertensive patients in Saudi Arabia in terms of their quality of life, lifestyle habits, and routine checkup.

Literature Review

Since December 2019, a novel coronavirus named SARS-CoV-2 has caused a worldwide outbreak of respiratory illness termed COVID-19 (Corona Virus Disease-19). Such a pandemic had induced governments to promote strict containment measures to reduce the spread of the infection, preventing patients from accessing healthcare services and thus impairing their regular follow-up with potential negative consequences on cardiovascular preventive measures. ⁽⁸⁾ Moreover, the development of cardiovascular disease requires a medium to a long period of risk exposure and lifestyle diseases are all about habits. ⁽⁹⁾

In one of the hospitals in Wuhan, the reports revealed that 48% of the non-survivors were hypertensives ⁽¹⁰⁾. In another report, 58% required ICU care. Among CVD patients, 25% required ICU admissions ⁽¹¹⁾. Data released by the National Health Commission of China revealed that 35% of COVID-19 patients were also hypertensive ⁽¹²⁾. WHO recommends that a person of age between 8 and 64 years should do at least 150 min of moderate-intensity physical exercise in a week ⁽¹³⁾. Regular physical exercises have significant benefits such as reduced risk of depression, hypertension, cardiovascular diseases, diabetes, and several types of cancer ⁽¹⁴⁾. The quarantine had restricted outer activities such as shopping, walking, swimming, and playing outdoor games. As a result, people are bound to live sedentary life.

As a consequence of decreased physical activity, oxidative stress in the body increases, leading to the oxidation of LDL (low-density lipoproteins), vascular inflammation, increased activity of the metalloproteases, and apoptotic death of endothelial cells. All these factors contribute to cardiovascular disease development. ⁽⁹⁾ Furthermore, Celik M conducted a study on 142 patients with primary hypertension (HT) who continued the same antihypertensive drugs before and during the pandemic. Twenty-four-hour Ambulatory Blood Pressure Monitoring (ABPM) and the Hospital Anxiety and Depression Scale (HADS) questionnaire were applied to patients.

Daytime, nighttime, and 24-hour-systolic blood pressure (SBP) levels as well as 24-hour-diastolic blood pressure (DBP) levels were significantly elevated during the COVID-19 outbreak compared to the pre-pandemic period ($p < 0.001$). Higher HADS-A scores ($\text{HADS-A} \geq 7$) were significantly associated with a much greater BP increase than the patients with lower HADS-A scores. Celik M concluded that psychological stress due to the COVID-19 outbreak worsened the regulation of BP in controlled hypertensive patients whose antihypertensive treatments did not change during the pandemic. ⁽¹⁵⁾

Bonner conducted a retrospective case-control study comparing people with hypertension to match healthy controls during the COVID-19 lockdown, of the 4362 baseline participants, 466 (10.7%) reported hypertension with no other chronic conditions. A subset of 1369 people were followed up for two months, which included 147 (10.7%) participants with hypertension; Bonner found that Anxiety was above normal levels during the COVID-19 lockdown in the hypertension group. ⁽⁵⁾

However, Huang conducted research on Measurements of BP from persons living in the Paris urban area using connected home BP monitors, three-time periods of e-health recordings were compared: during the pandemic, before the lockdown, and during the lockdown in 2019. Huang collected 297,089 BP recordings from 2,273 participants (age 56.3 ± 12.8 years, 81.1% male). During confinement, systolic BP gradually decreased by 3 mmHg (-2.4 to -3.9), and diastolic BP by 1.5 mmHg (-1.4 to -2.2) (all $p < 0.001$); this decrease was greater for participants with higher BP ($p < 0.0001$ each). ⁽¹⁶⁾

Finally, Aajal A had chosen a random sample of 100 patients followed in the cardiology department and they collected their demographic data as well as the

symptoms, vital constants, lifestyle before and 60 days after the lockdown. They found that the average age was 55.34 years $\pm$ 15.86. The average BMI (body mass index) was 26.40 Kg/m² $\pm$ 5.84. Coronary artery disease was present in 27% of the patients, valvular disease in 40%, and heart failure in 37%. Finally, arrhythmias appeared in 22%, and more than half of the sample had high blood pressure. They concluded a significant weight gain of 1.71 Kg ($P<0.000$) after 60 days of lockdown, with an increase of BMI of 0,58 kg/m² ($P<0,005$). The percentage of patients with SBP (systolic blood pressure) $\geq$ 140mmHg has increase by 6 % ($P<0,0001$), while the percentage of the patients with DBP (diastolic blood pressure) $\geq$ 90mmHg has passed from 21 to 15 % (thus a decrease of 6 %, $P<0,0001$).⁽¹⁷⁾

Methodology

Study subject

All Hail region Saudi residents who have been diagnosed with hypertension aged 20 or above

Study design

A cross-sectional survey is designed using google forms platform.

Sample size

A previous study done to assess the prevalence of hypertension in the Hail region showed that prevalence of Hypertension in Hail Region, KSA is 30.2 %

Assuming the adult Saudi population in the Hail region to be 731.147 (Initial mid-year estimates from the General Authority for Statistics, www.stats.gov.sa) with hypertension prevalence of 30.2 % and an error margin of 5% (95%CI: 46%- 54%), we calculated a sample size of 225 individuals. To account for a 30% loss from invalid cases (non-response, dropout, ineligible, or incomplete cases), the sample size required is 290. The online survey will be disabled when the sample size is achieved

Sample collection by:

Self-administered online questionnaire

Sample collection and processing

The questionnaire consisted of 34 close-open-ended questions guided by study objectives in Arabic language validity was tested.

Statistical Analysis:

Data was analyzed using SPSS version 25.0. The frequencies, percentages, mean and standard deviation were used to describe the variables. The chi-square was conducted to test the differences in the answers. A *p-value* less than 0.05 was considered statistically significant.

Results

Demographic information

A total of 226 people participated in the current study including 58.4% male and 41.6% female; most of them were aged between (51-60) years old (40.3%), followed

by (41-50) years old (25.2%). 67.7% were married. 96.5% were Saudi. 44.4% held bachelor's degrees, 24.45% got high school, 19.1% had below high school education, and only 12% held graduated degrees.

Health status

Participants with no disease were 41.6%, while 38.1% indicated that they had other diseases, 32.3% had diabetes, followed by obesity (24.3%), and the rest diseases had percentage less than 5% each. More than half are not smokers. Obese participants account for (50.9%) and overweight (33.8%), more than a half (56.2%) lost their weight, and 21.7% had no change, 80.1% had been diagnosed with hypertension before covid-19 quarantine. 40.3% reported that the measurement of blood pressure during the pandemic got worst, while 27.4% reported no change. 70.4% used medicine for blood pressure, 85.5% used it before the pandemic, 69.2% used it during the pandemic, and 69.2% took medication for high blood pressure for more than 2 years. 39.8% reported that they suffered from headaches, then 28.8% from dizziness, around 17% had Leg pain or swelling or leg cramps, numbness, tingling of hands, and Shortness of breath or difficulty breathing. 15% had blurry vision, close to 12.8% had Felt tired, thumping, or aching heart, and 11.1% had Felt weak when standing up. 32.3% reported faced others. 52.2% did refrain from visiting the doctor Due to COVID 19 pandemic, and 21.4% for one day, while only 17.3% immediately. 40.3% preferred to check blood pressure in a nearby primary health care clinic, and around 33.2% did it in a public and specialist hospital, on the other hand, 26.5% did not do any routine follow-up.

It is clear that patients visited health care facility for hypertensive-related problems (During covid-19 quarantine) less than before (68.5%) visited health care before the pandemic, compared to (52.7) after the pandemic. 36.7% did take more time to see a doctor in the hospital. 25.7% had an admitted to the hospital over the last year, and 22.7% was related to hypertension. 71.2% had not complications from hypertension ($p < 0.001$), 63% reported that these complications: renal diseases (4.4%), stroke (1.3%), retinopathy (11.5%) cardiovascular (0.9%) were during the pandemic.

Table (1)
Health statue

Statement	Factor	N	%	p value
Do you have any other diseases?	Diabetes	73	32.3	<0.001***
	Obesity	55	24.3	<0.001***
	Renal disease	8	3.5	<0.001***
	Liver diseases	8	3.5	<0.001***
	Cystic fibrosis	4	1.8	<0.001***
	Malignant	7	3.1	<0.001***
	Others	86	38.1	<0.001***
	Non	94	41.6	0.011*
Smoking statue	Yes	51	22.6	<0.001***
	Used to smoke	45	19.9	
	No	130	57.5	

BMI	Under weight	1	0.5	<0.001***
	Normal	33	14.9	
	Over weight	75	33.8	
	Obese	113	50.9	
Has your weight changed during the pandemic?	No change	49	21.7	<0.001***
	Get weight	30	13.3	
	Lose weight	127	56.2	
	IDK	20	8.8	
Have you been diagnosed of hypertension during or before covid-19 quarantine?	Before the pandemic	181	80.1	<0.001***
	After the pandemic	45	19.9	
The measurement of the blood pressure during the pandemic	Better	16	7.1	<0.001***
	Worst	91	40.3	
	No change	62	27.4	
	Did not measure the blood pressure	57	25.2	
Do you have any medicine for the blood pressure	Yes	159	70.4	<0.001***
	No	67	29.6	
Before the pandemic, did you use the medicine on time?	Yes	136	85.5	<0.001***
	No	23	14.5	
During the pandemic, did you use the medicine on time?	Yes	110	69.2	<0.001***
	No	49	30.8	
How long have you been taking medication for high blood pressure?	<One Year	12	7.5	<0.001***
	1-2 Years	29	18.2	
	> 2 Years	110	69.2	
	IDK	8	5.0	
Within the past 1 year, have you had the following symptoms?	Dizziness	65	28.8	<0.001***
	Numbness, tingling of hands	38	16.8	<0.001***
	Headaches	90	39.8	<0.002**
	Leg pain or swelling or leg cramps	40	17.7	<0.001***
	Shortness of breath or difficulty breathing	38	16.8	<0.001***
	Feeling tired Thumping or racing heart	29	12.8	<0.001***
	Feeling weak when I stand up	25	11.1	<0.001***
	Blurry vision	34	15.0	<0.001***
	Other	73	32.3	0.005*
When you developed these symptoms Did you refrain from	Yes	96	52.2	0.55(ns)
	No	88	47.8	

visiting the doctor Due to COVID 19 pandemic?				
When have you contacted health care service after development of symptoms?	Immediately	17	17.3	<0.001***
	6 hours	11	11.2	
	12 hours	6	6.1	
	1 Day	21	21.4	
	2 Days	16	16.3	
	More than 2 days	27	27.6	
Where do you regularly go for routine follow up to check your blood pressure?	Nearby primary health care clinic	91	40.3	<0.001***
	Public hospital	38	16.8	
	Specialist hospital	37	16.4	
	I do not do any routine follow up	60	26.5	
How often have you used to visit a health care facility for hypertensive related problems (before covid-19 quarantine)?	every 2 weeks	26	11.5	<0.001***
	every month or 2 months	41	18.1	
	Every 3 months	54	23.9	
	4-6 months	14	6.2	
	>6 months	20	8.8	
	never	71	31.5	
How often do you visit a health care facility for hypertensive related problems (During covid-19 quarantine)?	every 2 weeks	13	5.8	<0.001***
	every month or 2 months	21	9.3	
	Every 3 months	26	11.5	
	4-6 months	29	12.8	
	>6 months	30	13.3	
	Never	107	47.3	
During covid-19 quarantine did it take you more time to see a doctor in the hospital?	Yes	83	36.7	<0.001***
	No, it took less time	25	11.1	
	There is no deference	30	13.3	
	I'm not sure	88	38.9	
How long did it take you to see a doctor?	30 mints	57	47.9	<0.001***
	One hour	40	33.6	
	> One hour	22	18.5	
Over the last year have you been admitted to the hospital?	Yes	58	25.7	<0.001***
	No	168	74.3	
was it related to hypertension?	Yes	20	22.7	<0.001***
	No	68	77.3	
Have you had any complications from your hypertension?	No	161	71.2	<0.001***
	renal disease	10	4.4	<0.001***
	stroke	3	1.3	<0.001***
	retinopathy	26	11.5	<0.001***

	cardiovascular	2	0.9	<0.001***
If so, was it before the pandemic or during the pandemic?	Before the pandemic	17	37	0.07 (ns)
	During the pandemic	29	63	
* <i>p</i> <0.05, ** <i>p</i> <0.01, *** <i>p</i> <0.001, ns (Not significant)				

Physical, food habits, and depression:

Table (2) described physical, food habits, and depression using the 5-Likert scale. The level of stress and anxiety change were high (3.86 ± 1.04). Also, the level of consumption of fast food and fried foods change increased in a high level (3.40 ± 1.26). However, the level of intaking in a healthy balanced diet (including healthy ingredients such as wheat, legumes, eggs, nuts, fruits, and vegetables) has been moderated (2.71 ± 1.13), and the level of participation in aerobic exercises (such as walking, running, swimming, cycling and rope jumping) had a bit no change, it has a low level (2.43 ± 0.73).

To sum up, it shows that the pandemic had a negative effect on participants.

Table (2)
Physical, food habits and depression

Statement	Factor	N	%	M $\pm$ SD
During the corona virus quarantine, how did your participation in aerobic exercises (such as walking, running, swimming, cycling and rope jumping) change?	Significantly increased	10	4.4	2.43 $\pm$ 1.04
	Slightly increased	21	9.3	
	No change	69	30.5	
	Slightly decreased	83	36.7	
	Significantly decreased	43	19	
During the Covid-19 pandemic, how did your intake of a healthy balanced diet (including healthy ingredients such as wheat, legumes, eggs, nuts, fruits and vegetables)?	Significantly increased	19	8.4	1.13 $\pm$ 2.71
	Slightly increased	26	11.5	
	No change	89	39.4	
	Slightly decreased	55	24.3	
During the Covid-19 pandemic, how did your consumption of fast food and fried foods change?	Significantly increased	50	22.1	3.40 $\pm$ 1.26
	Slightly increased	63	27.9	
	No change	64	28.3	
	Slightly decreased	23	10.2	
	Significantly decreased	26	11.5	
During the Covid-19 pandemic, how did your stress and anxiety change?	Significantly increased	73	32.3	3.86 $\pm$ 1.04
	Slightly increased	76	33.6	
	No change	58	25.7	
	Slightly decreased	11	4.9	
	Significantly decreased	8	3.5	

Discussion

Our study shows that the vast majority of the participants were Saudi 96.5%, of the total of 226. Most of the respondents were married 96.7% and were holding a bachelor's degree. Other studies also conducted in Saudi Arabia and elsewhere showed almost the same demographic features of the respondents, where the most of participants were Saudi, married, and had bachelor's degrees ^(16,17,18). And this shows us the features of groups interested in such studies which facilitate awareness campaigns.

In our study, the vast majority have another disease (58.4%), most of our participants have another comorbidity besides hypertension and diabetes is the most reported at 32.3%, other studies also showed almost the same findings. Data released by the National Health Commission of China revealed that 35% of the patients suffering from COVID-19 were also facing hypertension and 17% of them had cardiovascular diseases ⁽¹²⁾ and this shows us that patient living with hypertension are at increased risk of developing other diseases. More than half of our participants are obese or overweight 84.7%. However, most of our responders reported that they lost some weight during the lockdown 56.2%. These findings are consistent with ⁽¹⁷⁾, where the average BMI (body mass index) was $26.40 \text{ Kg/m}^2 \pm 5.84$.

Most of the participants 40.3% reported that the measurements of the blood pressure during the pandemic were higher. These findings are in parallel with other studies. The percentage of patients with SBP (systolic blood pressure) $\geq 140 \text{ mmHg}$ has evolved from 38 to 44%, thus an increase of 6 % ⁽¹⁷⁾. The result shows that the pandemic has a significant burden on patients with hypertension.

Many of our patients are using anti-hypertension medications (70.4%), almost all of them used to take their medications on time before the pandemic but this has declined during the lockdown, other studies suggest the same finding. Daytime, nighttime, and 24 -hour-systolic blood pressure (SBP) levels as well as 24- hour-diastolic blood pressure (DBP) levels were significantly elevated during the COVID-19 outbreak compared to the pre-pandemic period ⁽¹⁵⁾. this finding could direct us to the reason behind the increased blood pressure levels.

During the pandemic, almost all the participants have developed some symptoms, including Shortness of breath and blurry vision 16.8% and 15.0%, respectively, also more the half of them refrained from visiting the doctor and even who contacted health care service after the development of symptoms chooses to do it after more than two days. Moreover, patients are refusing to visit health care facilities for their regular follow-ups during the lockdown. Other studies show similar findings, preventing patients from accessing healthcare services and thus impairing their regular follow-up with potential negative consequences on cardiovascular prevention. (8). This hesitation in visiting the hospital due to the fear of conducting the covid-19 virus has a negative influence on hypertensive patients, and more than a quarter of our patients have developed complications from hypertension (Renal diseases, stroke, retinopathy). The majority of these complications happened during the lockdown period 63%, also patient repeated

that it takes them more time to see a doctor in health care facilities during the pandemic.

Our results show that 55.7% of participants reported decreased physical activity during quarantine. Since this restriction limits people outside activities, many public places such as libraries, schools, and gyms remain closed. (9)

We asked the participant about their diet during the pandemic, and the results showed a combined 40.7% decrease in consumption of healthy diet. While the vast majority of participants reported either no change in their healthy diet 39.4% or an increase in their consumption of healthy diet 19.9%, as we see the result on healthy diet among hypertensive is variable and moderate. On the other hand, results of fast-food consumption have been significantly increased by 50%. Our results fall in with previous research. Being home-bound can also lead to people changing their diet which result in increased consumption of fast food and processed food, which can cause obesity. (19)

Levels of stress and anxiety show a whopping 65.9% increase (32.2% reported significantly increased and 33.6% reported slightly increased) in stress and anxiety. Quarantine is a distressing experience that can affect a person's psychological status. Effects such as boredom and uncertainty over the status of their illness can affect their psychological health like stress, and depression. (9)

Conclusions

The quarantine negatively influenced the hypertensive patients in terms of their quality of life and routine checkups which led to an increase in their blood pressure levels, decreased compliance with antihypertension medications, and pushed them toward a sedentary lifestyle these factors increased their predisposition of developing complications.

Ethical Consent:

The study has been reviewed and approved by the Research Ethical Committee at the University of Hail (no. of research H-2021-213)

Informed online consent was taken from everyone at the beginning of the questionnaire link before starting to answer the questionnaire.

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