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RESEARCH ARTICLE

THE PSYCHOLOGICAL IMPACT OF COVID-19 ON FRONTLINE HEALTHCARE WORKERS IN MOROCCO

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Abstract

Introduction: On March 11th 2020, the World Health Organization declared the infection of the virus "severe acute respiratory syndrome coronavirus 2" or SARS-COV-2 a pandemic. The virus, which was first discovered in China in Wuhan province in December 2019, has affected more than 100 million people and more than two million deaths in more than 200 countries. Along with other epidemics and pandemics, the existence of this virus has led to psychiatric disorders in people in or without direct contact with the disease, especially frontline healthcare workers.

Objective: To assess the impact of the virus on medical personnel working in Morocco, in particular stress, depression and sleep disorders.

Methodology: To explore this topic, we used an anonymity questionnaire based on, in addition to individual status and conditions, scales assessing stress, depression and sleep. The questionnaire was sent via social networks to health personnel working in Morocco in the various hospitals and departments treating patients infected with this virus. The CES-D (Center of Epidemiological Studies - Depression) scales for depression, the PSS-10 (Cohen's Perceived Stress Scale) for perceived stress and ISI (C. Morin's Insomnia Severity Index) for disorders of sleep, were chosen given their frequent use in a number of studies on the same topic.

Results: After sorting our responses rigorously, we were able to collect 376 responses, of which 53.5% were women, with an average age of 28.45 years, 23.9% were nurses, 14.4% general practitioners, 19, 7% of internal doctors 37.2% of residents or specialists and 4.8% occupied other functions such as medical transport. 66% of our candidates were at the level of the different university hospital centers of Morocco. Our candidates respectively occupied 39.1% 28.2% 29% and 25.8% triage positions, observation of suspected cases, the COVID sector and resuscitation. Regarding our results, it was observed that 71% of our participants presented moderate stress, 44.9% had a risk of developing depression and 53.7 had insomnia of varying severity. The female sex,

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the lack of medical, surgical and psychiatric history influence the occurrence of the three abnormalities studied, it should also be noted that these last three maintain a relationship of influences between them.

Conclusion: The exploration of stress, depression and insomnia revealed an impact of the state of health on the daily life of front-line health workers in Morocco.

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Introduction:-

SARS-COV-2 (severe acute respiratory syndrome coronavirus 2), appeared in the province of Wuhan in China in November 2019. The disease it causes, COVID-19, is one of the best known and the subject of all conversations in 2020.

On January 30, 2020, the World Health Organization declared COVID-19 to be "a public health emergency of international concern".(1)

Governments have been mobilized in the fight against this pandemic, both by limiting the mobilization of their citizens and by creating new hospitals and calling on healthcare personnel of all specialties to treat the sick.

To date, more than 100 million people around the world have been contaminated and 2.4 million have died as a result of complications from this scourge.

In Morocco, until November 26, 2020, more than 330,000 cases have been recorded with more than 5,500 deaths. Moreover, no official figures on the number of medical and paramedical personnel affected have been revealed(2)

In tandem with other health crises, this virus has a negative impact on the mental health of all individuals around the world, especially front-line healthcare personnel who are involved on a daily basis in the diagnosis, treatment and follow-up of sick individuals.

In our Moroccan context, the aim of our study is therefore:

1. To assess the psychological impact of the virus among medical and paramedical staff in Morocco, including stress, depression and sleep disorders.
2. To research the contributing factors of the different psychiatric disorders studied.
3. Compare our results with some reported studies.

Materials and Methods:-

The elaboration of this work was based on the realization of an anonymous online questionnaire through Google forms and shared between April 17 and May 20, 2020, with doctors, nurses and health technicians including laboratory technicians, paramedics and orderlies practicing in Morocco in the different posts intended for Covid-19, that is to say in the stations of triage, observation of suspicious cases, hospitalization of confirmed and stable cases as well as resuscitation for patients in critical condition.

Inclusion Criteria

1. Subjects over 18 years of age.
2. General practitioners, interns, residents and specialists in all specialties
3. Multi-skilled nurses, anesthetists or emergency physicians
4. Health technicians: laboratory, radiology, nursing aids.
5. Practicing in Morocco
6. Working in a department dedicated to suspect or confirmed Covid-19 patients

Exclusion Criteria

1. Healthcare personnel not in contact with patients suspected or confirmed to have Covid-19
2. Not practicing in Moroccan territory.
3. Questionnaires with missing primary data.

For the exploration of the three main axes of this work, the questionnaire is made up of 4 sections:

Socio-demographic conditions

which focused on age, gender, medical, surgical and psychiatric history, toxic habits during the last 3 months, region and structure of work (university hospital, regional hospital, tertiary hospital or private sector), functions and position during this pandemic.

The use of these nine questions is intended to evaluate risk factors of the different axes of psychological experiences studied in this work.

Exploring stress

using the French version of Cohen's Perceived Stress Scale (PSS-10) (3).

In the present study, we chose to work on the 10-item version because it not only presents the best overall psychometric qualities but also remains the most economical version in terms of the number of items.

Moreover, this scale brings a comparative value, given its use in several similar works.

Exploring Depression

The CES-D (Center of epidemiological studies - depression) scale originally published by Radloff in 1977. (4)

This instrument may be useful for assessing depressive symptoms, or screening for major depressive disorders in our target population.

Sleep Exploration

Insomnia Severity Index (ISI) is a very short scale (7 questions) that evaluates the nature of insomnia, the person's satisfaction with sleep, their daily functioning and their anxiety with respect to sleep disorders. (5)

Data mining was done using Microsoft Excel 2016 and Jamovi 1.6.7

Data analysis was performed using the Chi-square test for univariate qualitative data analysis.

A p-value <0.05 was considered the threshold The significance threshold is 0.05

Results:-

Descriptive statistics

We have attempted to group the results for the different individuals in Tables 1 and 2.

The result is thatThe predominant sex in our work was female (53.5%), the average age was 29.23 years (\pm 5.92), and the majority had no prior history of physical nor mental illness (71.3%).

Psychiatrically, the most frequently found disorders were depressive disorders and anxiety disorders (4.4% and 3.2% respectively).

The most predominant addictive behaviours were tobacco (18.4%) and alcohol (9.6%).

Our participants were primarily represented by resident physicians or specialists (37.2%), 55.63% of whom were recruited from other specialties to work in pandemic positions.

Health technicians were the least present in our work (4.8%).

Staff working at the university hospital center level were the most solicited (66%).

Our participants were able to work in the different work stations at percentages that are close to each other.

Finally, with regard to the results of the different scales, stress, risk of depression and insomnia were 79%, 44.9% and 53.7% respectively (Table 2 and Figure 1).

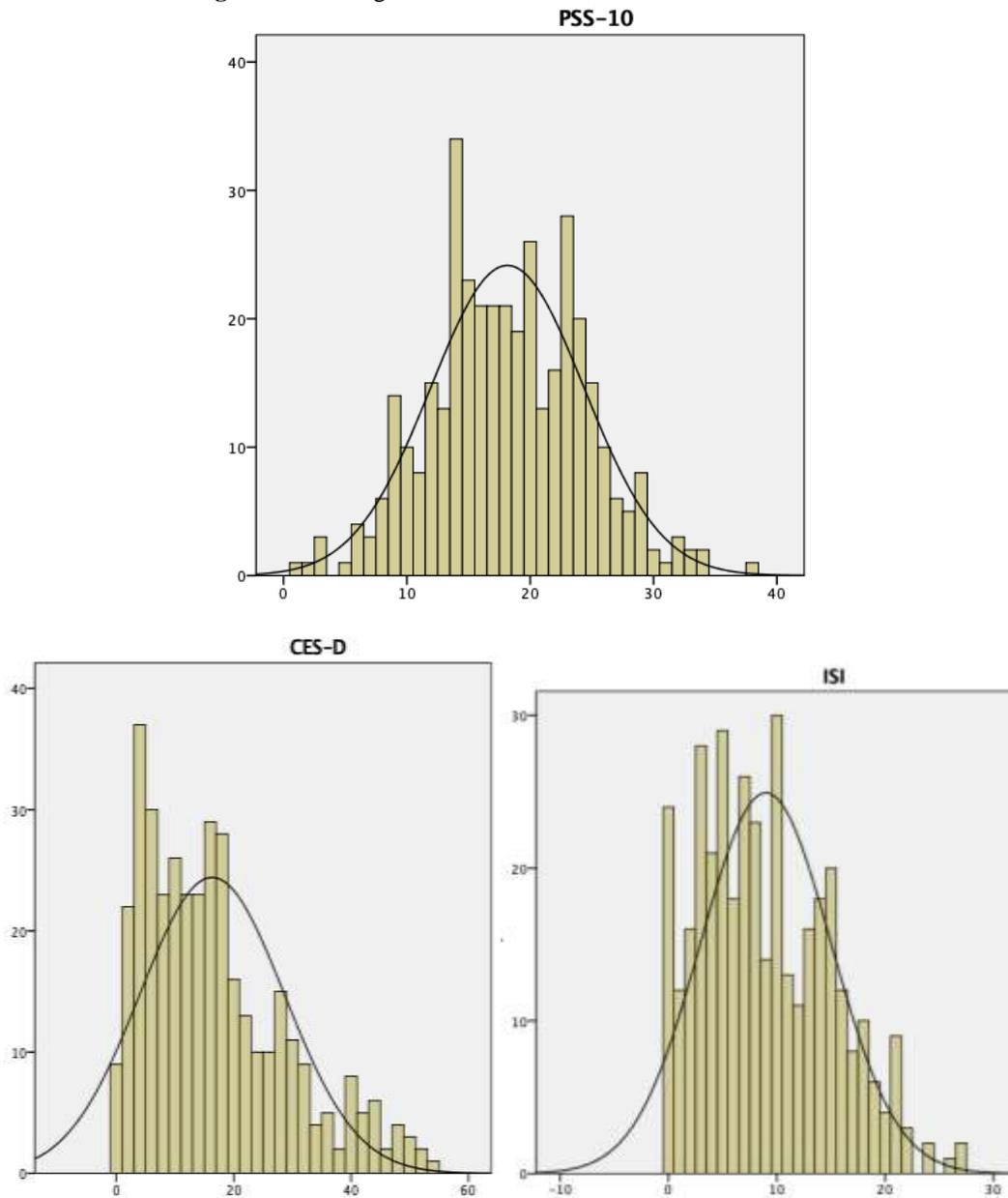
Table 1:- Demographic Characteristics of Applicants.

		N= 367 Effectif (%)
Age	18-29	29,23 (+/- 5,92)
	30-39	262 (69,7%)
	40-49	89 (23,7%)
	50-65	19 (5,1%)
	>65	4 (1,1%) 2 (0,5%)
Gender	Male	175 (46,5%)
Prior medical or surgical history	No prior	268 (71,3%)
	Good prognostic	73 (19,4%)
	N/D	35 (9,3%)
Prior psychiatric history	None	436 (92%)
	Depressif disorder	16 (4,4%)
	Anxiety disorder	12 (3,2%)
	Else	2 (0,5%)
Toxic habits	None	284 (75,5%)
	Tobacco	69 (18,4%)
	Alcohol	36 (9,6%)
	Cafeine	5 (1,3%)
	Benzodiazepines	6 (1,6%)
	Cocaine	1 (0,3%)
	Cannabis	3 (0,8%)
	Opioids	1 (0,3%)
Area of practice	Rabat-Salé-Kénitra	220 (58,5%)
	Casablanca-Settat	37 (9,8%)
	Marrakech-Safi	26 (6,9%)
	Fès-Meknès	13 (3,5%)
	Tanger-Tetouan-Al Hoceima	25 (6,6%)
	Oriental	12 (3,2%)
	Béni Mellal-Khénifra	9 (2,4%)
	Darâa-Tafilalet	14 (3,7%)
	Souss-Massa	7 (1,9%)
	Guelmim-Oued Noun	5 (1,3%)
	Laâyoune-Sakia El Hamra	5 (1,3%)
	Dakhla-Oued Ed-Dahab	3 (0,8%)
Fonction	Nurse	90 (23,9%)
	General physicien	54 (14,4%)
	Intern	74 (19,7%)
	Resident or specialiste	140 (37,2%)
	Else	18 (4,8%)
Speciality	Samespeciality	63 (16,8%)
Establishment	University hospital	248 (66%)
	Regional hospital	76 (20,2%)
	Tertiary hospital	34 (9%)
	Privatesector	18 (4,8%)
Position	Sorting station	147 (39,1%)
	Observation room	106 (28,2%)
	COVID department	109 (29%)
	Intensive care unit	97 (25,8%)
	Else	24 (6,4%)

Table 2:- Stress, depression and insomnia in the studied population.

		N=376	
Stress	PSS-10 score	18,15 (\pm 6,2)	
	Low	79 (21%)	
	Moderate	267 (71%)	297 (79%)
	High	30 (8%)	
Depression	CES-D score	16,3 (\pm 12,29)	
	Risk of depression	169 (44,9%)	
Insomnia	ISI score	8,98 (\pm 6)	
	Absente	174 (46,3%)	
	Sub-threshold	125 (33,2%)	202 (53,7%)
	Moderate	69 (18,4%)	
	Severe	8 (2,1)	

Figures 1:- Histograms of the PSS-10, CES-D and ISI results.



Analytical Statistics**Sleep (Table 3)**

There are statistically significant differences in insomnia by gender, medical/surgical history and exercise facility.

Depression (Table 4)

Only gender and medical or surgical history influence the risk of depression.

Stress (Table 5)

There is a statistically significant difference in gender, medical/surgical history and psychiatric history of stress.

Along with depression and sleep, occupational conditions (region, institution, function, position) do not influence stress except for radiology biology and screening center staff with $p=0.036$.

Table 3:- Contingency table for individual conditions and insomnia.

Individual conditions		Sleep		P-value
		No insomnia N= 174	Insomnia N= 202	
Age	18-29 y.o	123 (46,9%)	139 (53,1%)	0,180
	30-39 y.o	35 (39,3%)	54 (60,7%)	
	40-49 y.o	13 (68,4%)	6 (31,6%)	
	50-59 y.o	2 (50%)	2 (50%)	
	>60 y.o	1 (50%)	1 (50%)	
Gender	Males	97 (55,4%)	78 (44,6%)	<0,001
	Females	77 (38,3%)	124 (61,7%)	
Medical or surgical history	None	137 (51,1%)	131 (48,9%)	0,011
	Good prognostic	26 (35,6%)	47 (64,4%)	
	N/d	11 (31,4%)	24 (68,6%)	
Psychiatric history	None	165 (47,7%)	181 (52,3%)	0,234
	Anxiety disorder	3 (25%)	9 (75%)	
	Depressive disorder	5 (31,3%)	11 (68,8%)	
	Else	1 (50%)	1 (50%)	
Toxic habits	None	130(45,8%)	154(54,2%)	0,732
	Present	44(47,8%)	48(52,2%)	
Area of practice	Rabat-Salé	119 (54,1%)	101 (45,9%)	0,063
	Casa-Settat	15 (40,5%)	22 (59,5%)	
	Marrakech-Safi	9 (34,6%)	17 (65,4%)	
	Fès-Meknès	7 (53,8%)	6 (46,2%)	
	Tanger-Tétouan	6 (24%)	19 (76%)	
	Oriental	3 (25%)	9 (75%)	
	Beni-Mellal-Khénifra	3 (33,3%)	6 (66,7%)	
	Darâa-Tafilalet	5 (35,7%)	9 (64,3%)	
	Souss-Massa	2 (28,6%)	5 (71,4%)	
	Guelmim-Oued Noun	3 (60%)	2 (40%)	
	Laâyoune	1 (20%)	4 (80%)	
	Dakhla	1 (33,3%)	2 (66,7%)	
	Fonction	Nurse	36 (40%)	
General physicien		21 (38,9,1%)	33 (61,1%)	
Intern		43 (58,1%)	31 (41,9%)	
Specialist		66 (47,1%)	74 (52,9%)	
Else		8 (44,4%)	10 (55,6%)	
Establishment	University hospital	128 (51,6%)	120 (48,4%)	0,017
	Regional hospital	29 (38,2%)	47 (61,8%)	
	Private sector	8 (44,4%)	10 (55,6%)	

	Tertiaryhospital	9 (26,5%)	25 (73,5%)	
Position	Sorting station	75 (51%)	72 (49%)	0,139
	Observation room	46 (43,4%)	60 (56,6%)	0,483
	COVIDdepartement	47 (43,1%)	62 (56,9%)	0,433
	I.C.U	48 (49,5%)	49 (50,5%)	0,462
	Else	8 (33,3%)	16 (66,7%)	0,189

Table 4:- Contingency table of individual conditions and depression risk.

Individual conditions		Depression		P-value
		No risk N=207	Risk of depression N=169	
Age	18-29 y.o	141 (53,8%)	121 (46,2%)	0,724
	30-39 y.o	49 (55,1%)	40 (44,9%)	
	40-49 y.o	13 (68,4%)	6 (3,16%)	
	50-59 y.o	3 (75%)	1 (25%)	
	>60 y.o	1 (50%)	1 (50%)	
Gender	Males	120 (68,6%)	55 (31,4%)	<0,001
	Females	87 (43,3%)	114 (56,7%)	
Medical or surgical history	Aucun	165 (61,6%)	103 (38,4%)	<0,001
	Bon pronostic	26 (35,6%)	47 (64,4%)	
	Pronosticind	16 (45,7%)	19 (54,3%)	
Psychiatric history	None	197 (56,9%)	149 (43,1%)	0,065
	Anxiety disorder	4 (33,3%)	8 (66,7%)	
	Depressive disorder	5 (31,3%)	11 (68,8%)	
	Else	1 (50%)	1 (50%)	
Toxic habits	None	155(54,6%)	129(45,4%)	0,745
	Present	52(56,5%)	40(43,5%)	
Area of practice	Rabat sale	132 (60%)	101 (40%)	0,079
	Casa-Settat	19 (51,4%)	18 (48,6%)	
	Marrakech-Safi	13 (50%)	13 (50%)	
	Fès-Meknès	11 (84,6%)	2 (15,4%)	
	Tanger-Tetouan	8 (32%)	17 (68%)	
	Oriental	4 (33,3%)	8 (66,7%)	
	BeniMellal-Khénifra	5 (55,6%)	4 (44,4%)	
	Darâa-Tafilalet	7 (50%)	7 (50%)	
	Souss-Massa	2 (28,6%)	5 (71,4%)	
	Guelmim-Oued Noun	3 (60%)	2 (40%)	
	Laâyoune	2 (40%)	3 (60%)	
	Dakhla	1 (33,3%)	2 (66,7%)	
	Fonction	Nurse	47 (52,2%)	
General physicien		27 (50%)	27 (50%)	
Intern		48 (64,9%)	26 (35,1%)	
Specialist		73 (52,1%)	67 (47,9%)	
Else		12 (66,7%)	6 (33,3%)	
Establishment	Universityhospital	146 (58,9%)	102 (41,1%)	0,116
	Regionalhospital	38 (50%)	38 (50%)	
	Privatesector	9 (50%)	9 (50%)	
	Tertiaryhospital	14 (41,2%)	20 (58,8%)	
Position	Sorting station	89 (60%)	58 (39,5%)	0,086
	Observation room	50 (47,2%)	56 (52,8%)	0,054
	COVIDdepartement	56 (51,4%)	53 (48,6%)	0,36
	I.C.U	58 (59,8%)	39 (40,2%)	0,276
	Else	9 (37,5%)	15 (62,5%)	0,189

Table 5:- Contingency table of individual conditions and stress.

Individual conditions		Stress		P-value
		No stress N=79	Stress N=297	
Age	18-29 y.o	54 (20,6%)	208 (79,4%)	0,451
	30-39 y.o	17 (19,1%)	72 (80,9%)	
	40-49 y.o	6 (31,6%)	13 (68,4%)	
	50-59 y.o	1 (25%)	3 (75%)	
	>60 y.o	1 (50%)	1 (50%)	
Gender	Males	50 (28,6%)	125 (71,4%)	<0,001
	Females	29 (14,4%)	172 (85,6%)	
Medical or surgical history	None	69 (25,7%)	199 (74,3%)	0,002
	Good prognostic	7 (9,6%)	66 (90,4%)	
	N/d	3 (8,6%)	32 (91,4%)	
Psychiatric history	None	79 (22,8%)	267 (77,2%)	0,019
	Anxiety disorder	0 (0%)	12 (100%)	
	Depressive disorder	0 (0%)	16 (100%)	
	Else	0 (0%)	2 (100%)	
Toxic habits	None	57(20,1%)	227(79,9%)	0,432
	Present	22(23,9%)	70(76,1%)	
Area of work	Rabat-Salé	50 (22,7%)	170 (77,3%)	0,329
	Casa-Settat	7 (18,9%)	30 (81,1%)	
	Marrakech-Safi	5 (19,2%)	21 (80,8%)	
	Fès-Meknès	5 (38,5%)	8 (61,5%)	
	Tanger-Tetouan	2 (8%)	23 (92%)	
	Oriental	3 (25%)	9 (75%)	
	BeniMellal-Khénifra	0 (0%)	9 (100%)	
	Darâa-Tfilalet	5 (35,7%)	9 (64,3%)	
	Souss-Massa	0 (0%)	7 (100%)	
	Guelmim-Oued Noun	1 (20%)	4 (80%)	
	Laâyoune	1 (20%)	4 (80%)	
	Dakhla	0 (0%)	3 (100%)	
	Fonction	Nurse	25 (27,8%)	
General physicien		7 (13%)	47 (87%)	
Intern		15 (20,3%)	59 (79,7%)	
Specialist		28 (20%)	112 (80%)	
Else		4 (22,2%)	14 (77,8%)	
Establishment	University hospital	57 (23%)	191 (77%)	0,28
	Regional hospital	15 (19,7%)	61 (80,3%)	
	Private sector	4 (22,2%)	14 (77,8%)	
	Tertiary hospital	3 (8,8%)	31 (91,2%)	
Position	Sorting station	32 (21,8%)	115 (78,2%)	0,773
	Observation room	24 (22,6%)	82 (77,4%)	0,627
	COVID department	23 (21,1%)	86 (78,9%)	0,978
	I.CU	25 (25,8%)	72 (74,2%)	0,181
	Else	1 (4,2%)	23 (95,8%)	0,037

Cross-Tables

Cross-table of stress and insomnia showed that insomnia is strongly dependent on the presence of stress with a highly significant difference ($p < 0.001$).

In addition, insomnia is strongly linked with the risk of developing depression with a significant difference ($p < 0.001$).

Also, depression is highly linked with stress with a $p < 0.001$ (Tables 6, 7, and 8).

Tableau 6:- Cross-table of stress and insomnia.

		Sleep		P-value
		No insomnia N= 174	Insomnia N= 202	
Stress	No stress	58 (33,3%)	21 (10,4%)	<0,001
	Stress	116 (66,7%)	181 (89,6%)	

Table 7:- Cross-table of depression and insomnia.

		Sleep		P-value
		No insomnia N= 174	Insomnia N= 202	
Depression	No risk	140 (80,5%)	67 (33,2%)	<0,001
	Risk	34 (19,5%)	135 (66,88%)	

Table 8:- Cross-table of Stress and Depression.

		Depression		P-value
		No risk N=207	Risk N=169	
Stress	No stress	77 (37,2%)	2 (1,2%)	<0,001
	Stress	130 (62,8%)	167 (98,8%)	

Discussion:-

According to our study, our participants were mainly women, residents or specialists, working in the CHU in the Rabat-Salé-Kenitra region without any medical-surgical, psychiatric or addictive behavioural history.

53.7% presented insomnia. 79% presented stress. The mean score was 18.15, which is very significant compared to the value defined outside crises (< 13 according to Cohen et al. 1988(6)). And 44.9% are at risk of developing depression.

Concerning Relationships

Stress is related to gender, lack of medical-surgical and psychiatric history, and function in radiology laboratory, biology, epidemiology center and health transport.

Stress is more increased in individuals without a psychiatric history compared to those with a known psychiatric history; this raises the following question?

Would patients followed for psychiatric pathologies be protected from stress?

Depression is associated with female gender, lack of medical/surgical history.

And insomnia is related to female gender, lack of medical/surgical history and function at the University hospital level.

Stress, insomnia and depression seem to be strongly linked, with increases in one influencing increases in the other.

Limcaoco's publication (7) used the same scale as ours to quantify perceived stress in 1091 individuals, 227 of whom were health care workers.

The average score of the PSS-10 was 17.4, which is slightly lower than in our study (18.15).

His results indicated that there were no significant differences between health care workers and the general population, thus supporting further work on the 2003 SARS epidemic (McAlonan et al. 2007, Chua et al. 2004)(8,9).

According to a Chinese work by Lai et al. 2020 (10) According to a Chinese work by Lai et al. 2020 using the same scale to assess insomnia in frontline healthcare workers against covid-19, the median ISI score is 5 (2.0; 8.0) compared to 8 (4.0; 14.0) in our study 34% of front-line staff had insomnia (53.7% in our study).

In this study, severe insomnia is defined by a score of 15 or more, this represents 12.3% (lower than in our study 20.5%).

Like to our results; female gender was linked to insomnia.

Furthermore, contrary to our study, staff working in secondary hospitals (working in health centers) had a higher risk of depression, stress and insomnia (perhaps because in our context, they were not really confronted with COVID-19).

On the other side of the world, in Colombia, a study (PerdozoPupo et al. 2020)(11) targeting the Colombian population with a percentage of 44.1% of healthcare workers.

The average score on the perceived stress scale was 16.515% had severe stress (8% in our study).

A publication by Kang et al. 2020(12) describes the impact of the pandemic on healthcare workers, citing the following causes: long working hours, risk of infection, lack of protective equipment, loneliness, physical fatigue and distance from family.

To summarize (Table 9): The average stress in our study is slightly higher in the other two studies 18.15 versus 17.4 and 16.5.

We reinforced the hypothesis that the female sex was a stress factor.

For depression, our numbers were higher than the studies by Zhou et al. and Tang et al.

In the latter, individuals living in areas where diagnosis was available had less depression.

And finally, for insomnia, the percentage of insomnia was higher than in the two studies by Lai J et al and Zhou et al, the female sex in both studies was a provider of insomnia.

Zhou's results highlighted the influence of increased BMI of healthcare workers on insomnia.

Table 9:- Comparison of our results with the literature.

	Stress	Depressio n	Insomni a	Stressfactor s	Depressionfactor s	InsomniaFactor s
Our study	79% (Mean .18,15)	44,9%	53,7% (Med. 8)	Female gender, no prior historyof Psychiatric, medical or surgical history and laboratory work or medical transportatio n	Female gender, no prior medical or surgical history	Female gender, lack of history and working in the university hospital
Cabello et al. 2020	35%	38%	-	Young age, female gender, direct contact with patients (first-liners) and nursing staff.		

Limcaoco et al 2020	- (Mean . 17,4)	-	-	Young age, female gender, and students	-	-
Lai et al 2020	44,6%	50,4%	34% (Med. 5)	Individuals living in the Wuhan area, female gender, nursing staff and directly in contact with COVID + patients.		
Perdozopup o et al 2020	- (Mean . 16,5)	-	-	Individuals not convinced of the strategies adopted by the Colombian government	-	-
Zhou et al. 2020(10)	-	-	32%	-	Young age, female gender, increased hours of work and BMI	-
Tang et al. 2020 (13)	70,78	26,47%	-	Individuals living in areas where the diagnosis was available had less depression and anxiety.	-	-
Zhang et al. 2020 (14)			36,1%	Doctors, in isolation units, who feel that no psychological support is given to them and doubt the therapeutic effectiveness.		

Limits

The geographical distribution of our population was not equitable between the different regions of the kingdom (58.5% in the region of Rabat-Salé-Kenitra against 0.8% in the region of Dakhla-OuedEddahab and 9.8% for the region of Casablanca-Settat).

There was no comparator group; there was a general population to make the comparison with our candidates (healthcare workers in a region vs. Population in the same region).

Conclusion:-

As we have predicted, front-line health care personnel; that is, doctors, nurses and health technicians who are at war with this scourge on a daily basis are not immune to its psychological impact.

Being continuously confronted with COVID-19 has been shown to have an effect on stress, risk of depression and sleep patterns of our candidates, especially in women, people with no history and laboratory and observation room staff.

This raises the following question: What can be done to prevent the occurrence of these abnormalities?

This work encourages us to look for and explore other angles of this theme, namely:

1. Conducting studies targeting biology and radiology laboratory personnel who would be more stressed, which was revealed in our study
2. Compare the impact of the virus during the first wave versus the second wave of the pandemic.

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