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Type of the Paper (Original Article)

Gender and socio-economic issues in the clinical assessment of Orthopaedic patients during the COVID-19 pandemic

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Abstract: This observational study aims to depict the impact of gender and socio-economic issues on the health status of Italian Orthopaedic patients during the COVID-19 lockdown. An *Ad Hoc* questionnaire was developed and online administered. The following data were extracted from the questionnaire: age, body mass index (BMI), education level, distance from hospital, orthopaedic disease, concomitant medical comorbidities, living status (with/without cohabitants) and physical activity level (according to Tegner Activity Scale). The impact of the COVID-19 lockdown was studied analyzing differences related to the above-mentioned parameters.

A significant increase of the call number to general practitioner and to the orthopaedic surgeon was observed during the COVID-lockdown, especially in patients with higher education level. Nonetheless, a reduced compliance in drugs assumption was observed in patients with higher education level during lockdown (p=0.007). Almost all the analyzed items were significantly influenced by the distance between patient's domicile and the nearest hospital. However, no significant differences were observed comparing pre-COVID to COVID lockdown.

In the present study patients' gender and education level revealed a significant impact on the social behavior during the COVID lockdown, compared with the pre-COVID period.

Keywords: Covid-19 perception; general well-being; orthopaedic patients; gender; pandemic; socio-economic issues.

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1. Introduction

In late February 2020, a severe coronavirus disease 2019 (COVID-19) cluster was unexpectedly depicted in Northern Italy. The first the autochthonous case of COVID-19 was diagnosed on February 20th in Codogno (Lodi, Lombardy). In the following 24 hours, thirty-six more new COVID-19 cases, non-directly linked to Codogno Patient-1, were reported in Lombardy and Veneto.

The Italian Council of Ministers quickly put the two COVID-19 outbreak areas on quarantine, thus identifying the so-called "red zones". Nonetheless, in a few days, the virus spread exponentially in Northern Italy and thorough the country.

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Consequently, hospitals become overcrowded, several healthcare professionals become infected and a dramatic increase in mortality rate, among COVID-positive patients with comorbidities, was depicted. Based on these findings, on March 9th, 2020, the Italian government released a new decree, prohibiting travels and movement in public places, except for justifiable work reasons: the whole country was on lockdown.

This new scenario had an unpredictable impact on the mental status of both COVID and non-COVID patients and health-care professionals [1].

Previous studies have reported the Severe Acute Respiratory Syndrome (SARS) epidemic and the H1N1 flu significantly impacted on people mental status[2,3]. Therefore, during the SARS outbreak, several studies investigated the psychological impact of the disease on the non-infected community[4,5]. Older age, female gender and higher education were related to a higher fear of SARS contagion. Moreover, patients with SARS-like symptoms were more likely to take precautionary measures against the infection[6,7].

Currently, there is little information about gender and socio-economic differences in the perception of COVID-19 pandemic. This study aims to depict the impact of gender and socio-economic issues on the health status of Italian Orthopaedic patients during the COVID-19 lockdown.

2. Materials and Methods

A prospective multicentric observational study was performed. The study included all the Orthopaedic patients referring to the Orthopaedic emergency departments and Orthopaedic outpatient departments involved in the study, throughout Italy.

All the patients received an invitation to voluntary take part in the study. All the information collected had no diagnostic purposes and the results were treated confidentially, guaranteeing complete anonymity. Each patient completed an online form provided by the Orthopaedic surgeons involved in this multicenter study; all the data were subsequently gathered in a unique anonym database.

An *Ad Hoc* questionnaire was developed and online administered. The following data were extracted from the questionnaire: age, body mass index (BMI), education level, distance from hospital, orthopaedic disease, concomitant medical comorbidities, living status (with/without cohabitants) and physical activity level (according to Tegner Activity Scale).

All the participants were also asked to describe their relationship with the general practitioner, the orthopaedic surgeon and the Emergency Department during the pre-COVID period (November 2019-January 2020) compared to the COVID lockdown period (March-April 2020). Compliance in drugs assumption and in the local therapy (intraarticular injections; shock waves therapy; physiokinesistherapy) administration. The patients' frequency in looking for info about your health condition on the net and fear of COVID-19 infection were also investigated.

The impact of the COVID-19 lockdown was studied analyzing differences related to gender, age, education level, distance from hospital, number of medical comorbidities and living status.

Statistical analysis was performed using SPSS (version 20; IBM Corp, Armonk, NY). Descriptive statistics were used to evaluate the sample demographic characteristics. The Chi-square test and Fisher's exact test were used to assess the variability between groups.

Kruskal-Wallis test was performed to assess the variability between subgroups. The tests were two-tailed; statistical significance was set at $p<0.05$.

3. Results

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The main data of the study are summarized in table 1. 782 patients completed the *Ad Hoc* questionnaire (male: 422; female:360; mean age: 59.77 y. o.).

Table 2 shows gender- and age-related differences between pre-COVID and COVID lockdown period. No significant differences between genders and different age sub-groups were depicted.

Table 3 summarizes gender- and education level-related differences between pre-COVID and COVID lockdown period. A significant increase of the call number to general practitioner and to the orthopaedic surgeon was observed during the COVID-lockdown, especially in patients with higher education level. Nonetheless, a reduced compliance in drugs assumption was observed in patients with higher education level during lockdown (p=0.007).

Table 4 shows the results of the gender-specific analysis with reference to patients' distance from hospital. Almost all the analyzed items were significantly influenced by the distance between patient's domicile and the nearest hospital. However, no significant differences were observed comparing pre-COVID to COVID lockdown.

Table 5 focuses on the analysis of patients' comorbidities. No significant differences were depicted.

Table 6 summarizes gender- and living status-related analysis. No significant differences were observed.

Table 1. Main data of the study.

	All (n;%)	Female (n;%)	Male (n;%)	p value
Patients, n (%)	**n=782;100%**	**360;46.04%**	**422;53.96%**	
Age				.061
18-35 years, n (%)	22	12	10	
36-50 years, n (%)	58	36	22	
51-65 years, n (%)	325	145	180	
>65 years, n (%)	377	167	210	
Education				.006*
< High school	72	46	26	
High school	64	30	34	
Degree	646	284	362	
Distance from hospital				.086
<2km	342	152	190	
2-10 km	256	125	131	
10-20 km	39	24	15	
>20 km	145	59	86	
Orthopaedic disease				.454
Trauma	144	63	81	
Osteoporosis	153	68	85	
Osteoarthritis	164	83	81	
Muscle/tendon diseases	156	65	91	

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Spine diseases	165	81	84	
Medical comorbidities (i.e., obesity, diabetes, hypertension, dyslipidaemia, ischemic heart disease, COPD, malignancies)				.151
None	542	251	291	
1	206	91	115	
2	17	6	11	
>2	17	12	5	
Living status				.031*
Alone	173	77	96	
With 1 or more roommates	314	142	172	
With wife or husband	111	65	46	
With wife/husband and children	184	76	108	
Physical activity level:				
Level 0: Illness or disability pension	13	9	4	<.001*
Level 1: Sedentary work	199	102	97	
Level 2: Light work or walks on uneven ground but impossible excursions	105	53	52	
Level 3: Light jobs	131	69	62	
Level 4: Moderate heavy work	56	28	28	
Level 5: Heavy work, competitive sport-cycling, cross-country skiing, recreational sport, jogging on uneven ground at least 2 times a week	118	49	69	
Level 6: Recreational sport, tennis and badminton, handball, racquetball, skiing (downhill), jogging at least 5 times a week	96	35	61	
Level 7: Competitive sport-tennis, running, handball, recreational sport, soccer, football, rugby, ice hockey, basketball, squash, racquetball, running	41	10	31	
Level 8: Competitive sport, racquetball, bandy, squash	4	0	4	

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or badminton, athletics, skiing (downhill)				
Level 9: Competitive sport, soccer, football, rugby (lower leagues), ice hockey, wrestling, gymnastics, basketball	15	5	10	
Level 10: National competitive sport, soccer, football, rugby	4	0	4	

Table 2. Gender and age-related analysis

	Before COVID-19 pandemic									During lockdown								
	Female (n=360; 46%)				Male (n=422; 54%)				p value[a]	Female (n=360; 46%)				Male (n=422; 54%)				p value[b]	p value[c]
	18-35 yrs.	36-50 yrs.	51-65 yrs.	>65 yrs.	18-35 yrs.	36-50 yrs.	51-65 yrs.	>65 yrs.		18-35 yrs.	36-50 yrs.	51-65 yrs.	>65 yrs.	18-35 yrs.	36-50 yrs.	51-65 yrs.	>65 yrs.		
Referral to general practitioner																			
No	4	25	84	94	9	41	183	199	.692	10	27	96	99	8	12	118	113	.302	.498
Yes	8	11	61	73	13	17	142	178		0	5	38	39	2	10	62	97		
Referral to Orthopaedic surgeon																			
No	7	30	101	106	15	47	217	234	.634	8	26	100	85	15	41	206	188	.705	.547
Yes	5	6	44	61	7	11	108	143		4	10	45	82	7	17	119	189		
Call to general practitioner																			
No	3	29	88	89	6	44	185	196	.825	8	29	88	110	15	36	221	256	.141	.737
Yes	9	7	57	78	16	14	140	181		4	7	50	49	7	22	104	121		
Call to Orthopaedic surgeon																			
No	7	32	103	106	14	49	210	240	.298	7	26	96	96	14	37	212	224	.175	.430
Yes	5	4	42	61	8	9	115	137		5	10	49	71	8	21	113	153		

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Referral to Emergency Department																		
No	84	32 4	118 27	114 53	16 6	51 7	254 71	257 140	.695	12 0	36 0	142 3	166 1	21 1	55 3	315 3	377 0	.137	.928
Yes																			
Reported compliance in drug assumption																		
No	120	30 6	129 16	152 15	20 2	51 7	285 40	337 40	.211	4 8	16 20	74 71	107 60	8 14	22 36	185 140	238 139	.161	.160
Yes																			
Reported compliance in local therapy (intraarticular injections; shock waves therapy; physiokinesistherapy)																		
No	66	10 26	57 88	74 93	8 14	16 42	135 190	174 203	.473	4 8	11 25	50 95	84 83	7 15	19 39	131 194	201 176	.863	.867
Yes																			
Look for info about your health condition on the net																		
No	57	21 15	90 55	119 48	9 13	36 22	204 121	274 103	.933	9 3	16 20	81 64	75 92	11 11	24 34	171 154	171 206	.080	.334
Yes																			
Fear of COVID-19 infection																		
No										2	12	31	37	5	18	63	79	.784	
Yes										10	24	114	132	17	40	262	298		

a=Multivariate Analysis between Females and Males Before COVID-19 pandemic; b= Multivariate Analysis between Females and Males During lockdown; c= Multivariate Analysis between Females and Males and Before and During COVID-19 pandemic; *=p value<0.05.

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Table 3. Gender and education level

	Before COVID-19 pandemic							During lockdown							
	Female (n=360; 46%)			Male (n=422; 54%)			p value[a]	Female (n=360; 46%)			Male (n=422; 54%)			p value[b]	p value[c]
	< High school	High school	Degree	< High school	High school	Degree		< High school	High school	Degree	< High school	High school	Degree		
Referral to general practitioner															
No	26	18	163	17	24	184	.234	34	16	182	22	22	207	.277	.845
Yes	20	12	121	9	10	178		14	14	102	4	12	155		
Referral to Orthopaedic surgeon															
No	36	24	184	25	26	218	.179	40	22	157	23	29	179	.332	.699
Yes	10	6	100	1	8	144		6	8	127	3	5	183		
Call to general practitioner															
No															
Yes	27	22	160	17	26	179	.451	30	21	184	15	15	247	.051	**.029***
	19	8	124	9	8	183		16	9	100	11	11	115		
Call to Orthopaedic surgeon															
No	36	26	186	23	27	215	.395	31	22	172	18	24	237	.536	**.050***
Yes	10	4	98	3	7	147		15	8	112	8	10	125		

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Referral to Emergency Department															
No	43	28	201	26	32	248	.716	45	29	282	26	34	348	.228	.916
Yes	3	2	83	0	2	114		1	1	2	0	0	14		
Reported compliance in drug assumption															
No	38	26	259	19	30	321	.587	22	18	161	13	8	231	**.003***	**.007***
Yes	8	4	25	7	4	41		24	12	123	13	26	131		
Reported compliance in local therapy (intraarticular injections; shock waves therapy; physiokinesistherapy)															
No															
Yes	14	9	124	8	10	168	.954	11	3	135	2	5	202	.139	.457
	32	21	160	18	24	194		35	27	149	24	29	160		
Look for info about your health condition on the net															
No	23	15	197	10	17	261	.488	11	3	135	17	14	165	.450	.239
Yes	23	15	87	16	17	101		35	27	149	9	20	197		
Fear of COVID-19 infection															
No								17	7	57	8	9	67	.808	
Yes								29	23	227	18	25	295		

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Table 4. Gender and distance from hospital

	Before COVID-19 pandemic									During lockdown								
	Female (n=360; 46%)				Male (n=422; 54%)				p value[a]	Female (n=360; 46%)				Male (n=422; 54%)				p value[b]	p value[c]
	<2km	2-10km	10-20km	>20km	<2km	2-10km	10-20km	>20km		<2km	2-10km	10-20km	>20km	<2km	2-10km	10-20km	>20km		
Referral to general practitioner																			
No	107	61	15	24	130	56	10	29	**<.001***	102	80	15	35	118	81	8	44	.110	.847
Yes	45	64	9	35	60	75	5	57		33	30	6	13	72	50	7	42		
Call to general practitioner																			
No	106	68	15	20	122	64	9	27	**<.001***	101	75	16	43	122	85	11	59	.234	.830
Yes	46	57	9	39	68	67	6	59		51	50	8	16	68	46	4	27		
Referral to Orthopaedic surgeon																			
No	127	74	19	24	153	70	10	36	**<.001***	125	66	14	14	153	57	4	17	**<.001***	.924
Yes	25	51	5	35	37	61	5	50		27	59	10	45	37	74	11	69		
Call to Orthopaedic surgeon																			
No	127	78	19	24	148	69	10	38	**<.001***	95	83	14	33	135	84	11	49	**.029***	.428
Yes	25	47	5	35	42	62	5	48		57	42	10	26	55	47	4	37		

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Referral to Emergency Department																		
No	141	87	20	24	177	79	10	40	**<.001***	151	122	24	59	182	125	15	86	.110	.249
Yes	11	38	4	35	13	52	5	46		1	3	0	0	8	6	0	0		
Reported compliance in drug assumption																		
No	130	117	21	55	158	118	12	82	**.003***	58	82	15	46	82	85	13	72	**<.001***	.529
Yes	22	8	8	4	32	13	3	4		94	43	9	13	108	46	2	14		
Reported compliance in local therapy (intraarticular injections; shock waves therapy; physiokinesistherapy)																		
No	38	62	10	37	53	69	6	58	**<.001***	30	58	11	50	47	78	11	73	**<.001***	.452
Yes	114	63	14	22	137	62	9	28		122	67	13	9	143	53	4	13		
Look for info about your health condition on the net																		
No	74	86	21	54	94	102	13	79	**<.001***	86	70	11	41	103	65	6	22	**<.001***	.588
Yes	78	39	3	5	96	29	2	7		66	55	13	45	87	66	9	64		
Fear of COVID-19 infection																		
No										43	25	9	4	55	16	3	10	.253	

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Yes	[redacted]				109	100	15	55	135	115	12	76		

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Table 5. Gender and medical comorbidities (i.e., obesity, diabetes, hypertension, dyslipidaemia, ischemic heart disease, COPD, malignancies)

	Before COVID-19 pandemic									**During lockdown**								
	Female (n=360; 46%)				**Male (n=422; 54%)**				**p value[a]**	**Female (n=360; 46%)**				**Male (n=422; 54%)**				**p value[b]**	**p value[c]**
	None	1	2	>2	None	1	2	>2		None	1	2	>2	None	1	2	>2		
Referral to general practitioner																			
No	151	49	1	6	160	59	4	2	.788	158	60	5	9	163	79	5	4	.188	.170
Yes	100	42	5	6	131	56	7	3		93	31	1	3	128	36	6	1		
Call to general practitioner																			
No	157	47	2	3	155	59	5	3	.244	174	52	2	7	191	76	6	4	.710	.908
Yes	94	44	4	9	136	56	6	2		77	39	4	5	100	39	5	1		
Referral to Orthopaedic surgeon																			
No	170	59	4	11	190	67	8	4	.910	152	55	1	11	155	63	8	5	.088	.165
Yes	81	32	2	1	101	48	3	1		99	36	5	1	136	52	3	0		
Call to Orthopaedic surgeon																			
No	177	58	4	9	184	70	7	4	.914	153	60	4	8	192	77	7	3	.894	.632
Yes	74	33	2	3	107	45	4	1		98	31	2	4	99	38	4	2		

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Referral to Emergency Department																			
No																			
Yes	189	67	4	12	211	80	10	5	.677	250	89	6	11	282	111	10	5	.552	.532
	62	24	2	0	80	35	1	0		1	2	0	1	9	4	1	0		
Reported compliance in drug assumption																			
No																			
Yes	221	87	5	10	259	99	8	4	.231	134	50	6	11	170	70	8	4	.560	.522
	30	4	1	2	32	16	3	1		117	117	0	1	121	45	3	1		
Reported compliance in local therapy (intraarticular injections; shock waves therapy; physiokinesistherapy)																			
No																			
Yes	97	43	4	3	124	58	3	1	.392	107	37	4	1	147	57	4	1	.507	.986
	154	48	2	9	167	57	8	4		144	54	2	11	144	58	7	4		
Look for info about your health condition on the net																			
No	164	62	4	5	20	79	5	1	.525	119	50	3	9	132	55	5	4	.923	.739
Yes	87	29	2	7	88	36	6	4		132	41	3	3	159	60	6	1		
Fear of COVID-19 infection																			
No										54	23	1	3	54	28	1	1	.983	
Yes										197	68	5	9	237	87	10	4		

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Table 6. Gender and living status

	Before COVID-19 pandemic									During lockdown								
	Female (n=360; 46%)				Male (n=422; 54%)				p value[a]	Female (n=360; 46%)				Male (n=422; 54%)				p value[b]	p value[c]
	Alone	With 1 or more roommates	With wife or husband	With wife/husband	Alone	With 1 or more roommates	With wife or husband	With wife/husband		Alone	With 1 or more roommates	With wife or husband	With wife/husband	Alone	With 1 or more roommates	With wife or husband	With wife/husband		
Referral to general practitioner																			
No	43	83	42	39	48	92	30	55	.915	53	31	40	48	60	107	24	60	.981	.975
Yes	34	59	23	37	48	80	16	53		24	51	25	28	36	35	22	48		
Call to general practitioner																			
No	42	82	43	42	47	93	28	54	.997	49	93	42	51	64	108	32	73	.941	.943
Yes	35	60	22	34	49	79	18	54		28	49	23	25	32	64	14	35		
Referral to Orthopaedic surgeon																			
No	52	97	46	49	58	110	35	66	.754	44	88	42	45	40	107	27	57	.419	.983
Yes	25	45	19	27	38	62	11	42		33	54	23	31	56	65	19	51		
Call to Orthopaedic surgeon	53	97	51	47	56	112	35	62	.854	54	83	45	43	63	118	30	68	.264	.891
No	24	45	14	29	40	60	11	46		23	59	20	33	33	54	16	40		
Yes																			
Referral to Emergency Department	58	109	51	54	67	126	36	77	.921	75	142	63	76	91	169	45	103	.714	.792
No	19	33	14	22	29	46	10	31		2	0	2	0	5	3	1	5		
Yes																			

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Reported compliance in drug assumption																			
No	70	125	60	68	83	152	42	93	.856	49	79	34	39	67	100	25	60	.980	.878
Yes	7	17	5	8	13	20	4	15		28	63	31	37	29	72	21	48		
Reported compliance in local therapy (intraarticular injections; shock waves therapy; physiokinesistherapy)																			
No																			
Yes	30	62	22	33	48	71	17	50	.566	6	59	22	32	57	74	22	56	.542	.952
	47	80	43	43	48	101	29	58		41	83	43	44	39	92	24	52		
Look for info about your health condition on the net																			
No	46	94	42	53	67	112	34	75	.526	40	79	31	31	46	82	21	47	.722	.681
Yes	31	48	23	23	29	60	12	33		37	63	34	45	50	90	25	61		
Fear of COVID-19 infection																			
No										20	24	19	18	19	38	8	19	.183	
Yes										57	118	46	58	77	134	38	89		

a=Multivariate Analysis between Females and Males Before COVID-19 pandemic; b= Multivariate Analysis between Females and Males During lockdown; c= Multivariate Analysis between Females and Males and Before and During COVID-19 pandemic; *=p value<0.05.

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4. Discussion

At the beginning of the second decade of the 21st century, in the era of Medicine 4.0, the health care systems worldwide fought the COVID-19 challenge. Italy was the first country to lockdown in Europe, to struggle with the new coronavirus diffusion. This choice revealed useful in flattening the COVID-19 curve but revolutionized several aspects of our lives.

Ruggieri et al. [8] have investigated the impact of gender differences on the COVID-19 infection in Italy, depicting a higher mortality rate in male patients (14.8%) compared with female patients (8.2%). These Authors suggest both biological - i.e., sexual hormones, X-linked genes expression and differential ACE2 expression levels- and lifestyle differences might explain these gender-related differences.

Moreover, Galasso et al. [9] analysed data from a survey conducted in March and April 2020 in eight Organization for Economic Co-operation and Development countries (n = 21,649) to study gender differences in COVID-19–related beliefs and behaviours. These Authors showed that women are more likely to perceive COVID-19 as a very serious health problem, to agree with restraining public policy measures, and to comply with them.

This study has focused on the analysis of gender and socio-economic issues in the clinical assessment of Orthopaedic patients during COVID-19 lockdown, compared with the pre-COVID-19 period. Gender, age, education level, distance from hospital, number of medical comorbidities and living status were analyzed. Gender and education level reveal the most relevant factors liable to influence the patients' social behavior during the COVID lockdown, compared to the pre-COVID period. Patients' domicile distance from the nearest hospital also had a relevant impact on the patients' behavior, but no significant differences were observed during COVID lockdown, compared to pre-covid period.

Concerning the perceived risk to contract the COVID-19 infection, Abrams et al. (17) have emphasized the role of risk communication during the COVID pandemic. Therefore, the fear of contracting the COVID-19 disease is as real as the physical danger itself. The present study highlighted there are some aspects of the pandemics that can heighten the risk perception, i.e., the so-called dread factors, that largely apply to the current pandemic. These factors include high infection rates, the COVID significant morbidity and mortality, the low availability of face masks and personal safety devices, the lack of therapeutic measures and the rapid virus spread.

These factors could underestimate the perception of risk among the general population and, at the same time, they could also underestimate the importance of compliance with the restriction rules. Our data confirm the findings reported by Abrams et al.[10], since the vast majority (71.22%) of participants, in absence of gender differences (p=0.082), reported a quite high contagion perception risk.

Furthermore, Abrams et al. have also emphasized that daily headlines generate widespread fear and panic, and the World Health Organization (WHO) reported a significant part of effective communication risk includes the identification and management of rumors and misinformation. In this context, our data support the reported by Abrams et al., since 304 women (38.87%) and 264 men (33.76%) affirmed they had a medium-high level of fear to contract the infection. This finding has probably promoted the respect of the limitations imposed by the Italian government: 355 women (45.40%) and 411 men (52.56%) affirmed they paid attention in adopting all the measures needed to reduce the risk of SARS-CoV-2 infection.

Jungmann et al.[11], moreover, highlighted health anxiety and cyberchondria has increased the SARS-CoV-2 anxiety. Jungmann et al. also observed anxiety is negatively related to the degree of information about the pandemic status. Our data agree with this

finding, since the participants' psychological level is good as well as the perception that the participants have of their level of information on the pandemic condition.

The findings reported in the present study are useful to plan future public health policies in order to improve patients' care and optimize patients' compliance.

5. Conclusions

In the present study patients' gender and education level revealed a significant impact on the social behavior during the COVID lockdown, compared with the pre-COVID period. Patients' domicile distance from the nearest hospital also play an important role in influencing patients' behavior and clinical compliance. These findings are useful to better plan future public health policies.

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