

IMPACT OF COVID-19 PANDEMIC ON SEXUAL BEHAVIOR

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Abstract. The aim of our study was to investigate the changes in sexual behavior related to the COVID-19 restrictions of the lockdown in Romania. An online questionnaire was distributed on various social media groups during confinement, trying to include subjects with different backgrounds, educational levels, and fields of activity. Besides the collection of demographic data (age, gender, sexual orientation, education, occupation, relationship status, etc.), knowledge about COVID-19, sexual and reproductive health, information about sexual behavior (sexual desire, frequency of sexual activity, masturbation, etc.), alcohol and other psychoactive substances and comorbidities were noted. A total of 642 participants completed the survey. During the COVID-19 self-isolation/social distancing, 19.8% of subjects (n=100) reported a decrease in sexual desire, 35.5% (n=180) recognized a decrease in sexual activity and 56.9% (287) described an increase in the frequency of masturbation. The decrease in sexual activity was significantly higher (53.8%) in participants who identified within the lesbian, gay, bisexual, and transgender (LGBT) community. The multinomial logistic regression proved that the decrease in sexual activity was significantly correlated with not being in an exclusive relationship and a decrease in sexual desire during the COVID-19 lockdown.

Keywords: COVID-19, sexual activity, sexual behavior, survey, lockdown.

INTRODUCTION

During the last and two years, the coronavirus (COVID-19) pandemic caused a worldwide medical, social, and economic crisis, with an increase in discrimination and social exclusion [1,2]. Many countries, including Romania, implemented restrictions, including total lockdown (16th March-15th May 2020), to control the spread of the infection [3]. This included travel bans, schools, restaurants, theaters, cinemas, and concert halls closing, the shift towards remote working, and especially organization of COVID hospitals and safe circuits and the reprioritization of medical services triggered a significant impact on life quality [4]. Therefore, the ubiquity, uncertainty, misinformation, economic restraint, and the stress caused by the overlap of professional and personal life had huge consequences on mental health, but also on the sexual health [5].

Social distancing, travel bans, several restrictions meant to decrease the transmission rate of the SARS-CoV-2 virus, prompted drastic changes in daily life [6]: married couples spent more time at home,

in crowded habitat with their children, with professional and domestic tasks, lack of intimacy; couples living at distance found hard to reunite and keep the relation in spite of restrictions; single persons experienced more difficulties in engaging in new partnerships and perceived restrictions more frustrating, dating and casual sex being risky. For the later groups, if being familiar and trusting, dating apps, internet sex, were considered safe alternatives. There has been recorded an augmentation in dating apps for chatting/texting, sexting, solo sex, sex toys [7], webcam meetings and an enrichment of the sexual repertoire [8]. Summarizing, the following situations were the most common: those engaged in stable relations and living together, couples living separately who could not reunite, persons engaged in extramarital relations, those practicing casual sex, couples with at least one member working in the frontline, those who contracted the disease, sex workers, and lonely individuals. Above the commonly expected mental health problems, sexual wellbeing seemed a rather neglected topic.

There is a paucity of studies regarding the topic of sexual practices, as confinement measure were taken

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rapidly, couples hard to reunify and studies difficult to design in fluid sociological, familial situations and investigate sexual habits [9,10]. So far, few studies from different countries regarding the impact of COVID-19 pandemic on sexual behavior reported a global decrease in sexual desire and intercourse and an increase in pornography use and masturbation, with negative consequences on sexual satisfaction and the quality of life [11-14]. While general rules about social distance, disinfection were explicit expressed by the Romanian Ministry of Health and the Department of Emergency Situations, no clear statements were issued regarding the intimate life, reproductive risks. Besides assisting the general population regarding safety, health issues, economic and social security during disasters, there should be mandatory the emphasis on prevention of domestic violence, on the neglected part of sexual well-being, and safeguarding human rights and information about safe sexual practices and reproductive health, enlargement of the sexual repertoire, prevention of coercive sex [15]. The range of sexual practices varied from abstinence, disinterest, masturbation, practice of sexuality within a safe environment, coercive sex, a shift towards digital sex, risky behaviors and unhealthy use/ addiction to technology. Due to sparse knowledge about the transmission risk of SARS-CoV-2 virus during sexual practices, abstinence and masturbation were considered safe, but they were rather frustrating on long term, lacking the intimacy bonding. As an alternative, digital sex (sexting, video sex) is rather popular within younger persons, familiar with technology, but also possible subject of extortion, data leakage and theft [15]. To offer reliable information regarding safe sexual practices or issues concerning reproductive health, accessible recommendations were addressed to the general population but also to special vulnerable groups or persons [16-18].

We conducted the first study in Romania to evaluate the influence of COVID-19 restrictions on sexual health, through an online survey.

MATERIAL AND METHODS

We conducted a cross-sectional convenience sample study through an online survey in adults over 18 years. The questionnaire was distributed on social networks between April 30th and May 15th (the end of the lockdown in Romania).

Ethical aspects

Before answering the questions, all participants

read and approved the informed consent online sheet, the brief description of the objectives of the survey, the respect of anonymity according to the GDPR data, age > 18 years. No financial incentive was offered.

The study followed the Declaration of Helsinki ethical guidelines. The research was approved by the Ethical Committees of the "Iuliu Hatieganu" University of Medicine and Pharmacy in Cluj-Napoca (registration number 170/29.04.2020) and of the Institute of Sexology.

Questionnaire

The online survey consisted of 52 items, developed by the authors, regarding demographic data, partner status, knowledge about the COVID-19 disease and its potential implications on sexual and reproductive health, but also upon health status and consumption patterns, and questions regarding sexuality: attractiveness, sexual drive, frequency and types of sexual practices, satisfaction, importance of sexual creativity and employment of internet facilitating encounters, erotic devices.

Statistical analysis

We performed a descriptive analysis of the data which was expressed as means \pm SD, absolute values and fractions. The chi-square and Fisher's exact test were used for comparing categorical variables and Student t or Mann-Whitney U test were employed for to compare continuous variables. Factors which influenced sexual frequency during COVID-19 pandemic were evaluated by multivariate analysis. The significance level was set at $P < 0.05$. The statistical analysis was performed with IBM SPSS Statistics, version 23.0.

RESULTS

A total of 642 participants responded to the online survey: 69.6% were women, 29.8% were men and 0.6% identified as non-binary and other genders. Their demographic characteristics are shown in Table 1. The mean age was 33.3 (SD=11.4) years (range 19 to 80 years). Significantly younger women, between 19-29 years, answered the questionnaire (OR=1.5, CI95%=1.07-2.1, $p=0.019$) than men. Most responders declared to be heterosexual (90.3%) and 10 subjects (1.56%) did not disclose their sexual orientation. Significantly more men identified as gay than women (OR=6.8, CI95%=2.8-16.5, $p < 0.0001$). Most participants were educated, working especially in the medical field. 24 participants, including one person

that identified as non-binary did not disclose their occupational field.

The opinions and the level of information regarding COVID-19 transmission through sexual behaviors and their impact on the frequency of sexual relations are summarized in Table 2.

51.7% of respondents indicated that their main source of information are scientific articles (which is highly unlikely since very few papers were published on this matter at the outbreak of Covid-19 pandemic). Only half the subjects, men (52.1%) and women (52.5%) alike, believed that the information they have at present is reliable.

Subjects were generally well informed about the possible sexual ways of transmission of COVID-19 but knowing the potential risks did not significantly influence the frequency of sexual intercourse. The only exception was the practice of rimming—significantly more subjects which described an increased sexual frequency believed it was rather dangerous (61%) or unsafe (29%), ($p=0.024$).

The disinfection process before sex was not

associated with a significant decrease in libido and in the frequency of sexual relations. Only 34.6% of respondents reported they would be afraid to have sex with a medical professional and 58.4% claimed they would continue to live in a same room with their partner even if they were medical professionals.

66.1% believed that a pregnancy during the COVID-19 pandemic was safe. Responders were indistinctly aware of the fact that some fluids such as saliva, perspiration, sexual fluids, or sexual practices might be possible implied in the transmission of COVID-19 disease (from vaginal intromission, oral sex, anal sex, statistically significant for rimming); disinfection has not been an important issue but did not contribute to decrease of libido. The employment of conventional contraception and condoms seem to be considered similarly safe.

COVID-19 impact on sexual health is presented in Table 3. More subjects who were not in an exclusive relationship reported an increase in libido, but a decrease in sexual frequency. Subjects in an exclusive relationship reported both unchanged

Table 1. Demographic characteristics of participants (N=642)

Variable	Total (N=642) (%)	Male (N=191) (%)	Female (N=447) (%)	Other (n=4) (%)
Age (years)	33.3±11.4	32.5±11	35.3±12	32.5±9.8
19-29	328 (51.1)	84 (44)	242 (54.1)	2 (50)
30-39	146 (27.7)	49 (25.7)	96 (21.5)	1 (25)
40-49	94 (14.6)	29 (15.2)	64 (14.3)	1 (25)
50-59	55 (8.6)	21 (11)	34 (7.6)	0
Over 60	19 (3)	8 (4.1)	11 (2.5)	0
Sexual orientation				
Heterosexual	571 (90.3)	161 (85.6)	409 (92.7)	1 (25)
Bisexual/Pansexual	34 (5.4)	7 (3.8)	25 (5.7)	2 (50)
Homosexual	27 (4.3)	20 (10.6)	7 (1.6)	
Education				
Highschool	136 (21.2)	25 (13.1)	110 (24.6)	1 (25)
Bachelor	312 (48.6)	97 (31.1)	215 (48.1)	0
Master	130 (20.2)	43 (33.1)	86 (19.2)	1 (25)
Doctorate	64 (10)	26 (13.6)	36 (8.1)	2 (50)
Occupation				
Student	145 (22.6)	26 (13.6)	119 (26.7)	0
Employed	379 (59.1)	110 (57.6)	267 (59.7)	2 (50)
Self-employed	96 (14.9)	49 (25.6)	45 (10.1)	2 (50)
Unemployed	14 (2.2)	4 (2.1)	10 (2.2)	0
Maternity leave	4 (0.6)	0	4 (0.9)	0
Retired	4 (0.6)	2 (1.1)	2 (0.4)	0
Field of Activity				
Medical	420 (68)	106 (57.6)	312 (72.4)	2 (66.7)
Administrative	52 (8.4)	18 (9.8)	34 (7.9)	0
Technical	47 (7.6)	32 (17.4)	15 (3.5)	0
Psychology	39 (6.3)	5 (2.7)	34 (7.9)	0
Legal/Military	13 (2.1)	6 (3.3)	7 (1.6)	0
Services	15 (2.4)	7 (3.8)	7 (1.6)	1 (33.3)
Arts	4 (0.6)	3 (1.6)	1 (0.2)	0
Education	28 (4.5)	7 (3.8)	21(4.9)	0

Table 2. The impact of opinions and the level of information regarding COVID-19 transmission through sexual behaviors and sexual frequency

Variable	Total	Sexual Frequency			P
		Increased N=53 (%)	Unchanged N=274 (%)	Decreased N=178 (%)	
Do you think you have credible information about sex and COVID-19?					
Yes	271 (53.5)	28 (52.8)	144 (52.6)	99 (55)	.98
No	128 (25.2)	13 (24.5)	72 (26.3)	43 (23.9)	
Unsure	108 (21.3)	12 (22.6)	58 (21.2)	38 (21.2)	
Can COVID-19 be transmitted by kissing?					
Yes	461 (91.2)	46 (86.8)	248 (90.6)	167 (93.8)	.31
No	23 (4.6)	5 (9.4)	13 (4.7)	5 (2.8)	
Unsure	21 (4.2)	2 (3.8)	13 (4.7)	6 (3.4)	
Can COVID-19 be transmitted by saliva or perspiration?					
Yes	426 (84.4)	41 (77.4)	234 (85.7)	151 (84.4)	.53
No	41 (8.1)	5 (9.4)	21 (7.7)	15 (8.4)	
Unsure	38 (7.5)	7 (13.2)	18 (6.6)	13 (7.3)	
Can COVID-19 be transmitted by semen or vaginal secretion?					
Yes	116 (22.9)	7 (13.2)	63 (23)	46 (25.6)	.28
No	228 (45)	25 (47.2)	129 (47.1)	74 (41.1)	
Unsure	163 (32.1)	21 (39.6)	82 (29.9)	60 (33.3)	
Is unprotected vaginal penetration dangerous during COVID-19?					
Yes	297 (59)	31 (59.6)	152 (55.9)	114 (63.7)	.58
No	35 (19.6)	12 (23.1)	64 (23.5)	35 (19.6)	
Unsure	95 (18.9)	9 (17.3)	56 (20.6)	30 (16.8)	
Is oral sex dangerous during COVID-19?					
Yes	240 (47.6)	27 (50.9)	127 (46.9)	86 (47.8)	.77
No	130 (25.8)	14 (26.4)	66 (24.4)	50 (27.8)	
Unsure	134 (26.6)	12 (22.6)	78 (28.8)	44 (24.4)	
Is anal sex dangerous during COVID-19?					
Yes	274 (54.3)	28 (52.8)	141 (51.8)	105 (58.3)	.12
No	83 (16.4)	14 (26.4)	42 (15.4)	27 (15)	
Unsure	148 (29.3)	11 (20.8)	89 (32.7)	48 (26.7)	
Is rimming dangerous during COVID-19?					
Yes	313 (62)	32 (60.4)	162 (59.6)	119 (66.1)	.02
No	47 (9.3)	10 (18.9)	20 (7.4)	17 (9.4)	
Unsure	145 (28.7)	11 (20.8)	90 (33.1)	44 (24.4)	
If you and your sexual partner disinfect yourselves, will you be protected from COVID-19?					
Yes	143 (28.4)	12 (23.1)	77 (28.2)	54 (30.3)	.31
No	296 (58.8)	29 (55.8)	166 (60.8)	101 (56.7)	
Unsure	64 (12.7)	11 (21.1)	30 (11)	23 (12.9)	
The disinfection process decreases your libido?					
Yes	76 (15)	4 (7.5)	23 (8.5)	49 (27.2)	.001
No	383 (75.8)	46 (86.8)	231 (84.8)	106 (58.9)	
Unsure	46 (9.1)	3 (5.7)	18 (6.6)	25 (13.9)	
Are conventional contraceptive methods effective against COVID-19?					
Yes	321 (63.4)	28 (53.8)	177 (64.6)	116 (64.4)	.51
No	116 (22.9)	16 (30.8)	63 (23)	37 (20.6)	
Unsure	69 (13.6)	8 (15.4)	34 (12.4)	27 (15)	
The condom is effective against COVID-19?					
Yes	306 (60.6)	28 (53.8)	169 (61.7)	109 (60.9)	.81
No	140 (27.7)	18 (34.6)	72 (26.3)	50 (27.9)	
Unsure	59 (11.7)	6 (11.5)	33 (12)	20 (11.2)	

libido and unchanged sexual frequency. Slightly more individuals who were not in an exclusive relationship believed that sexual creativity was important (sexting, video chat, pornography), but the difference was not statistically significant. Masturbation has been employed as response to increased libido by this group. The frequency of sexual intercourse varied in both groups, between weekly, monthly or none in the second group.

53.8% of subjects who identified as LGBT reported a decrease in sexual activity, *versus* 34.3%. Participants who only graduated high school reported a more significant decrease in sexual activity during the COVID-19 pandemic than subjects with higher education. Alcohol use was associated with a decrease in sexual activity. Masturbation was reported more

frequently by subjects with less sexual activity with a partner during the COVID-19 pandemic.

Less sexual desire was correlated with less sexual activity. The multinomial logistic regression analysis revealed that only low libido and not being in an exclusive relationship were closely related to lower sexual activity (Table 4).

DISCUSSION

Our study shows preliminary data on the effects of COVID-19 restrictions on sexual activity during the lockdown in Romania. Similar to other studies, we found a general decrease in the frequency of sexual intercourse, correlated to partner relationship and sexual desire (19.8% of respondents reported a decrease

Table 3. COVID-19- related impact on sexual health

Items	Total	In an exclusive relationship	Not in an exclusive relationship	P
Sexual desire				
Increased	120 (23.7)	75 (18.9)	45 (40.9)	<.001
Unchanged	286 (56.5)	243 (61.4)	43 (39.1)	
Decreased	100 (19.8)	78 (19.7)	22 (20)	
Sexual frequency				
Increased	53 (10.5)	43 (10.8)	10 (9.1)	<.001
Unchanged	274 (54)	249 (62.7)	25 (22.7)	
Decreased	180 (35.5)	105 (26.5)	65 (68.2)	
Is sexual creativity important during the pandemic?				
Yes	432 (67.7)	256 (64.5)	176 (73)	.082
No	149 (23.4)	102 (25.7)	47 (19.5)	
Unsure	57 (8.9)	39 (9.8)	18 (7.5)	
Masturbation				
Yes	287 (56.9)	197 (50)	90 (81.8)	<.001
No	217 (43.1)	197 (50)	20 (18.2)	
Sexual frequency during COVID-19 pandemic				
Daily	31 (6.2)	18 (4.6)	13 (12)	<.001
Weekly	229 (45.5)	203 (51.4)	26 (24.1)	
Monthly	179 (35.6)	145 (36.7)	34 (31.5)	
Several times a year	20 (4)	15 (3.8)	5 (4.6)	
None	44 (8.7)	14 (3.5)	30 (27.8)	

Table 4. Factors influencing sexual frequency during COVID-19 pandemic determined by logistic regression analysis

Variable	Univariate analysis	Multivariate analysis		
	P value	OR ^a	P value	95% CI
Age (year)	.22	- ^b	-	-
Gender	.94	-	-	-
Sexual orientation	.02	1.3	.7	0.32-5.2
Education level	.01	1.33	.21	10.84-2.1
Field of activity	.37	-	-	-
In/not in an exclusive relationship	<.001	0.58	<.001	0.02-0.16
Alcohol use	.007	1.82	.13	0.82-4.03
Substance use	.46	-	-	-
Masturbation	<.001	1.51	.33	0.65-3.48
Sexual desire	<.001	0.027	<.001	0.01-0.06
Disinfection before sex	.001	1.49	.34	0.65-3.4
Chronic general medical conditions	.97	-	-	-

in libido in the present study, *versus* 22%, respectively 25% in a Chinese population) [11, 19].

A British study [20], performed on young persons during the lockdown, emphasized a general decrease of sexual behaviors, with a marked reduction of sexual desire in young women. An Italian study, on the other hand, reported a general decrease of sexual intercourse, diminished sexual desire in men, and a positive association between sexual desire and sexual intercourse [21].

Gender differences and detailed sexual response were outlined as decrease of pleasure, satisfaction, desire and arousal in women [22]. Despite an increase of desire and arousal, participants did not translate into sexual frequency and intercourse [23].

The current sample did not identify an age-related sexual decline, as reported in China or in the United Kingdom [12, 20]. Sexual health and activity are not independent, being very sensitive to mental and physical health, stress, socioeconomic factors, explaining the upward trend at the outbreak of the pandemic. But individuals involved in steady relationships, living with their partner enjoyed during this period even other aspects of emotional security; children present continuous in the household proved to be rather a stressful factor, with consequences in the decrease of sexuality of the couples [19, 24]. But a detailed analysis of women and male sexual aspects assessed by adequate psychometric scales, offered a more accurate picture of the phenomenon: in countries with less mortality during the COVID-19 pandemic, women's sexuality was not affected by the quarantine, with increase desire in young women, decreased pain, better orgasm while being financial active [21], in contrast of similar increase desire, intercourses but lower satisfaction [13].

Various other studies claim that men's sexuality involved in steady relations was less influenced by quarantine [12,21]. It seems that age, type of partnership and sexual desire were relevant to the sexual frequency in women, recording less sexual partners and seldom sexual intercourse with age increase [19], in contrast to the data from Yuksel *et al.* 2020 [13] which noted in their sample that in spite the increased desire and frequency, the general level of sexual satisfaction diminished. Jacob *et al.* 2020 [12] predicted more clearly that unmarried, older women were predictive for lower sexual activity during this reclusion time. As for men, Jacob *et al.* 2020 [12] stated the young, married, involved in domestic relationships, drinking alcohol compared involved in sexual activities more than once a week.

The decrease of sexual activity pushed couples to enlarge their sexual repertoire [6].

Data regarding sexuality before and during lockdown is that of Coombe *et al.*, 2020 [7] established the trend that could be observed: lessen of sexuality by 53.55%, more with a spouse, less with a girl/boyfriend, or casual hook ups, increase of dating apps in single or non-cohabitating couples. Probably the most affected due to imposed abstinence were single adults, feeling frustrated, irritable, applying either rescue actions- masturbation, dating apps, or sex toys [8].

High frequency of pornography use, and masturbation were more common among subjects who were not involved in an exclusive relationship, probably due to social distancing imposed by COVID-19 pandemic and were correlated with a negative impact on sexual satisfaction, especially for men [25, 26].

Interestingly, the opinions and the perceived level of information about the potential transmission of COVID-19 in a sexual context were not correlated to a change in the frequency of sexual behavior.

The limitations of the study include the use of a self-designed online questionnaire, completed by a convenient sample. We had an obvious selection bias, since 79.2% of subjects had at least a university degree or higher, which could impact the attitude toward sexuality.

This was the first study to investigate the impact of COVID-19 self-isolation/social distancing in Romania during the lockdown on sexual health.

In conclusion, the cross-sectional study, developed and distributed via online methods during the lockdown period in Romania, succeeded to be completed especially by young, educated persons (more women, declared as heterosexual, working predominantly in the medical field). The acknowledgement of the potential risks of a possible sexual transmission of COVID-19 disease, nor the disinfection process or the proximity of a medical partner might did not influence sexual activity. The sexual desire and sexual frequency decreased depending on the type of relationship, alcohol consumption but not age dependent. Persons involved in a non- exclusive relationship although with increased libido, had rather lower sexual frequency intercourse, due to lack of available partners, applying to masturbation, virtual sexuality. The restrictions imposed by the COVID-19 pandemic had a negative impact on sexual well-being.

Interventions to promote safe sexual activity are needed especially for those who live alone in self isolation or identify as LGBT.

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Institutional review board statement

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of “Iuliu Hatieganu” University Of Medicine And Pharmacy (protocol code 170/29.04.2020).

Informed consent statement

Informed consent was obtained from all subjects involved in the study.

Conflict of interest

The authors declare no conflict of interest.

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