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SITUATION OF CAT GUARDIANS AND COVID-19: REFLECTIONS ON HUMAN HEALTH

(SITUAÇÃO DOS TUTORES DE GATOS E A COVID-19: REFLEXÕES SOBRE A SAÚDE PÚBLICA)

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RESUMO

Diante da pandemia instaurada pela COVID-19, percebe-se o surgimento de diferentes indagações quanto à prevenção e tratamento. Um dos pontos chamativos, e foco do presente estudo, diz respeito a uma possível imunização ao SARS-CoV-2, adquirida mediante o contato recorrente com os gatos. Partindo desse pressuposto, o presente artigo tem como objetivo analisar e refletir acerca da situação de tutores de gatos durante a pandemia COVID-19. Realizou-se uma pesquisa descritiva transversal, do tipo survey e quantitativa, a qual contou com 1.239 respondentes em um questionário elaborado pelos autores e os dados obtidos foram analisados de forma estatística. Resultou que 74,74% explicitaram exposição ao vírus. Para os respondentes, a incidência de hospitalização foi de 0,48%. Diante dos resultados alcançados, pode-se observar uma baixa propensão de tutores de gatos às internações.

Palavras-chaves: Proteção; Imunidade; Tutores de gatos; SARS-CoV-2

ABSTRACT

In the wake of the COVID-19 pandemic, several questions have arisen regarding prevention and treatment. One of the salient points, which serves as the focus of the present study, concerns a possible immunization to SARS-CoV-2 acquired through recurring contact with cats. Based on this

assumption, the present study aims to analyze and reflect the situation of cat guardians during the COVID-19 pandemic. A cross-sectional and quantitative descriptive study was conducted in the form of a survey, with 1,239 participants completing a questionnaire prepared by the authors. The results showed that 74.74% of the respondents had been exposed to the virus, while the hospitalization rate was 0.48%. Considering these results, it can be seen that cat guardians are highly unlikely to require hospitalization.

Key words: Protect; Immunity; Cat Guardians; SARS-CoV-2

INTRODUCTION

COVID-19 is an infectious pandemic disease first diagnosed in humans in late December 2019 in the province of Hubei, in China (WANG et al., 2020). The etiologic agent of this disease was identified as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2).

The manifestations of COVID-19 can vary from a cold to severe pneumonia, and may progress to acute respiratory distress syndrome, with a high probability of admission to intensive care and risk of death (HUANG et al., 2020). Furthermore, patients who are severely infected by the virus are more contagious compared to patients with mild symptoms (MARTIN et al., 2020).

In the current pandemic situation, it is necessary to consider the importance of "One Health", which includes the human-animal-environment interrelationship and preventive measures intended to control zoonotic diseases like COVID-19 (ABREU et al., 2020). As human health is increasingly linked to animal health in the environment that they share, the following question may be asked: How have cat guardians fared during the COVID-19 pandemic?

It is proposed that repeated contact with animal coronaviruses may provide cross-protection against infection by SARS-CoV-2 (JURGIEL et al., 2020). The possibility that peoples exposed to multiple microorganisms in the environment could be more resistant to a serious manifestation of COVID-19 is also discussed (SEHRAWAT; ROUSE, 2020). Therefore, it can be considered that cats, through the pathogens in their bodies, expose their guardians to more antigens, stimulating the human immune system.

Moreover, it is claimed that cross-protection can be mediated by humoral and cellular adaptive immune responses, with the action of antibodies and cytotoxic (T) cells, respectively. In addition, antibody responses can significantly decrease after infection, while T cell responses protect, at least partially, against various coronavirus infections (SARIOL; PERLMAN, 2020). Thus, memory T cells, induced by previous infection with viruses related to the new coronavirus, can shape the pathology caused by SARS-CoV-2 (LE BERT et al., 2020). It is suspected that cats, if infected by

feline coronavirus (FCoV), could be a source of protection against the new coronavirus by stimulating cross immunity.

Thus, the aim of this study was to analyze and reflect about cat guardians during the COVID-19 pandemic, focusing on the possibility of cats strengthening their guardians' immune systems (PERSON et al., 2019).

MATERIAL AND METHOD

To confirm the originality of the study and a theoretical contribution that could aid the arguments regarding its findings, journal databases, such as Pubmed, Scopus, Web of Science and Google Scholar, were searched for articles that could help to conduct the research. The search string "COVID-19" AND "tutor*" OR "guardians" OR "custody" AND "cat*" OR "feline*" was used, and no study was found with a similar purpose at the time when the search was made.

In view of the objective of this research, which consists of analyzing and reflecting about cat guardians during the COVID-19 pandemic, a cross-sectional survey and quantitative study were conducted within an epidemiological model using a semi-structured questionnaire. This research instrument was available from November 2020 to March 2021 and was applied through social media to cat guardians during the COVID-19 pandemic.

The research instrument used two sections of open- and close-ended questions. The first section, entitled "Socio-demographic and occupational section", was composed of 14 questions and was intended to gain a better identification of the research population. The second section, entitled "Health during the pandemic section", included 8 questions. Therefore, the research instrument contained a total of 22 questions. The inclusion criterion in the research was to have been a cat tutor since before or during the COVID-19 pandemic. The questionnaire was to be completed spontaneously. People who had tested for COVID-19, whether positive or negative, and those not tested were considered. 1,239 responses were obtained. In the analysis, descriptive statistics were used.

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RESULTS

Following the application of the research instrument, statistical analyses were performed to gauge whether the results substantiated the assumptions of the study. To this end, the profiles of the respondents (n = 1,239) are shown in Table 1:

Table 1 - Socio-demographic and occupational profile of survey respondents

Questions	Total (n = 1,239)	
	Frequency	**%**
Brazilian Region		
South	1,019	82.24
Southeast	96	7.75
Northeast	39	3.15
Midwest	36	2.91
North	8	0.65
Other countries		
Portugal	1	0.08
Argentina	1	0.08
Uruguay	1	0.08
Peru	1	0.08
Spain	3	0.24
Colombia	34	2.74
Genre		
Female	1,044	84.26
Male	192	15.50
Other	3	0.24
Age group		
15 to 30 years	422	34.06
31 to 40 years	339	27.36
41 to 50 years	243	19.61
51 to 60 years	172	13.88
Over 60 years	63	5.08
Ethnicity		
White	1,029	83.05
Brown	119	9.60
Black	41	3.31
Yellow	8	0.65
Indigenous	2	0.16
Hispanic	40	3.23
Marital status		
Single	530	42.78
Married	392	31.64
Civil union	208	16.79
Divorced	82	6.62
Widowed	27	2.18
Profession		
Self-employed	380	30.67
Public sector worker	310	25.02
Student	235	18.97
Civil servant	203	16.38
Unemployed	83	6.70
Health professional	25	2.02
Statutory	3	0.24
Wage income (country's minimum wage)		
1 minimum wage	119	9.60
1 to 3 minimum wages	472	38.10
4 to 6 minimum wages	321	25.91
Over 6 minimum wages	327	26.39

Education		
High school and elementary school	274	22.12
Higher education	495	39.95
Post-graduate	470	37.93
Number of people in the residence		
Lives alone	163	13.16
Two people	451	36.40
Three people	335	27.04
Four people	207	16.71
Five people	55	4.44
Over five people	28	2.26

Table 1 shows the predominance of respondents who live in the South of Brazil (82.24%), most of whom are female (84.26%) and in the 15-40-year age group (61.42%). Regarding ethnicity, the majority are white (83.05%). Furthermore, 42.78% of the people are single, and 31.64% are married.

With regard to their professions, self-employed workers are predominant (30.67%), with an income of 1 to 6 minimum wages (64.00%). As for schooling, 77.88% have completed a university degree and a graduate degree. Concerning residence, most house 2 to 3 people (63.44%).

The interaction between cat guardians and cats as well as the health status of the respondents are addressed in Table 2:

Table 2 - Epidemiological profile of cat guardians

Questions	**Total (n = 1,239)**	
	Frequency	**%**
Have you been exposed to COVID-19?		
No	313	25.26
Yes	926	74.74
Number of CATS in the residence		
One	491	39.63
Two	350	28.25
Three	156	12.59
More than three	242	19.53
Did you have CATS before the pandemic?		
Yes	1,195	96.45
No	44	3.55
Do you have contact with cats outside the residence?		
Yes	816	65.86
No	423	34.14
Do you have contact with other animals? If so. which ones?		
Only cats	477	38.50
Cats and dogs	588	47.46
Cats. dogs and others	155	12.51
Cats and others	19	1.53
Have you been tested for COVID-19?		
No	815	65.78
Yes		
Negative	340	27.44
Positive	**84**	**6.78**
Did you need to be hospitalized?		
No	1,233	99.52
Yes	**6**	**0.48**

Do you have comorbidities?		
No	1,017	82.08
Yes*	222*	17.92
Obesity	81	36.48
Lung diseases	80	36.04
Hypertension	80	36.04
Diabetes	27	12.16
Heart diseases	19	8.56
Other comorbidities	68	30.63
Did you have any symptoms of COVID-19?		
No	**1,136**	**91.69**
Yes*	103*	8.31
Tiredness	87	84.46
Vomiting	76	73.78
Aches and pains	69	66.99
Dry cough	63	61.17
Sore throat	63	61.17
Diarrhea	53	59.55
Shortness of breath	48	46.60
Chest pressure	**38**	**36.89**
Fever	30	29.12
Loss of taste and smell	22	21.36
Skin rashes	16	15.53
Conjunctivitis	12	11.65

*values from confirmation

It should be highlighted that 91.69% of the respondents declared that they were asymptomatic, including those who did not have COVID-19 confirmed by clinical-laboratory diagnosis, although 74.74% had been exposed to the virus, predominantly through visits to supermarkets, butchers and bakeries (73.28%), pharmacies (72.80%), public places (squares and streets) (61.18%) and contact with individuals at work (58.43%).

Regarding the number of cats per respondent, only one cat (39.63%) per guardian predominated. However, it was found that 19.53% of the people tutored more than three cats. Furthermore, 96.45% of those surveyed had tutored cats since before the outbreak of the pandemic. However, 65.86% of the individuals, in addition to having contact with their cats, had contact with cats outside their home. Indeed, 61.50% of the respondents also had contact with other types of animals, such as dogs, rabbits, horses, cows, goats, pigs and birds.

Of all the respondents, 65.78% were not tested for COVID-19 and 6.78% tested positive for it. It should be highlighted that only 6 people (0.48%) needed to be hospitalized: 2 who were not tested, 1 whose test was negative and 3 who tested positive for COVID-19. Nevertheless, despite being hospitalized, they only showed mild symptoms of the disease, such as tiredness (n = 1), aches and pains (n = 1), diarrhea (n = 1), conjunctivitis (n = 1), vomiting (n = 1), and loss of taste (n = 1). One person reported chess pressure, one of the more serious symptoms.

Regarding the symptoms mentioned by the respondents, the following may be highlighted: tiredness (7.02%), aches and pains (5.57%), dry cough (5.08%), sore throat (5.08%), vomiting

(6.13%), diarrhea (4.28%), chest pressure (3.07%), shortness of breath (3.87%), fever (2.42%), loss of taste (1.77%), skin rashes (1.29%) and conjunctivitis (0.97%).

Another aspect that was addressed was comorbidities. 82.08% of the respondents claimed that they were healthy, in other words, with no comorbidities. Of those who had comorbidities (17.92%), the most common were obesity (36.49%), lung diseases (36.04%) and hypertension (36.04%).

The relationship between comorbidity and hospitalization is shown in Table 3:

Table 3 - Crossover between comorbidity and hospitalization

Crossing		Hospitalization		Freq. (%)
		Not (%)	**Yes (%)**	
Comorbidity	**Not**	1,012 (81.68)	**5 (0.40)**	1,017 (82.08)
	Yes	221 (17.84)	1 (0.08)	222 (17.92)
Freq. (%)		1,233 (99.52)	6 (0.48)	1,239 (100.00)

Unlike what is normally observed in COVID-19 patients, Table 3 shows that, of the six people who required hospitalization, 5 presented no comorbidities.

Table 4, in turn, addresses the relationship between being tested for COVID-19 and hospitalization:

Table 4 - Crossover between COVID-19 examination and hospitalization

Crossing		Hospitalization		Freq. (%)
		No (%)	**Yes (%)**	
Test	**No**	810 (65.38)	2 (0.16)	812 (65.54)
	Yes	423 (34.14)	**4 (0.32)**	427 (34.46)
	Negative	342 (27.60)	**1 (0.08)**	308 (27.45)
	Positive	81 (6.54)	**3 (0.24)**	69 (6.15)
Freq. (%)		1,233 (99.52)	6 (0.48)	1,239 (100.00)

One fact that stands out is that only 3 of the 84 people who declared that they tested positive for COVID-19 required hospitalization. Interestingly, 3 other respondents, 2 who were not tested and one who tested negative, also needed hospitalization, a total hospitalization rate of 0.48%, which is considered a very low rate given the current pandemic context.

DISCUSSION

Of the findings, it should be highlighted that only 0.48% of the cat guardians required hospitalization. Of these, only one individual presented clinical comorbidities, which is not in keeping with the literature, as pre-existing diseases such as diabetes and chronic lung disease, are considered predisposing factors to COVID-19 (SHI et al., 2020; ISER, et al., 2020). Furthermore, although 74.74% of the respondents were exposed to the virus, 91.69% remained asymptomatic to COVID-19, including those who were not tested for the disease (65.78%). Of those with symptoms (8,31%), these tended to be mild, such as tiredness, vomiting, aches and pains and a dry cough. Only 3.07% of the

respondents reported feeling chest pressure, which is considered a more serious symptom of COVID-19 (ISER, et al., 2020)

The results suggest that cats may provide some kind of immunological protection during the current pandemic, possibly related to the expression of the degree of illness of COVID-19, so that cat guardians tend to manifest milder clinical conditions of the disease, when not asymptomatic.

As for the limitations of this study, it is evident that no pilot test was conducted prior to the application of the research instrument to the cat guardians. Another limitation was related to the fact that this research is very recent, and consequently there is a lack of articles and publications that widely discuss the effect of cats on human health during a pandemic, which makes it difficult to discuss this study. However, the scarcity of literature on the subject in question adds a positive aspect to the research, as it emphasizes the relevance of studies of this nature. It is worth highlighting that the population under study is younger, concentrated in the 15-40 age group and thus outside the high-risk group of the elderly when the new variants of the virus are not taken into account (SHI et al., 2020).

Considering the findings and the profile of the study sample, it should be emphasized that searches were made for articles in indexed databases (Pubmed, Scopus, Web of Science and Google Scholar) on the subject in question. The studies that were found differed methodologically from the present study or explored different themes, and therefore this limits any critical comparison with the presented data. However, some scientific articles discussed protective factors against infections by pathogens, such as the new coronavirus, and it was possible to establish a relationship with the thesis that cats, to some degree, have provided a form of protection for their guardians during the pandemic (JURGIEL et al., 2020; SEHRAWAT; ROUSE, 2020; SHARUN et al., 2020; FACCINI et al., 2020).

It is argued that protection against SARS-CoV-2 through exposure to animal coronaviruses is a positive factor considering the strong presence of the animal virus in the animal population (JURGIEL et al., 2020), providing a certain measure of cross immunity. It is estimated, with this bias, that infection by feline coronavirus (FCoV) is globally omnipresent in domestic feline populations, and this information is supported by serological studies that have pointed out a rate of seropositivity of 25% to 40% for FCoV in domestic pet cats, and a rate of 80 to 100% in cases of cats from catteries, where the feline population is denser (ALMEIDA; GALDINO; ARAÚJO, 2019). It is also highlighted that FCoV is difficult to eliminate because its transmission follows the susceptible-infected-susceptible (SIS) model and because of the presence of chronic carriers, which make up around 20% of the population in densely populated areas (PALTRINIERI et al., 2020; HARTMANN, 2005). This justifies why it was decided to investigate the relationship between FCoV and SARS-CoV-2 during the COVID-19 pandemic.

Studies have demonstrated however, that FCoV diverges from the new coronavirus and claimed that there is no definitive evidence that proves the role of prior exposure to FCoV in protecting the immune system against SARS coronaviruses (SHARUN et al., 2020; STOUT et al., 2020). Despite this, the authors argue in favor of the need for a cautious evaluation of the potential for a cross reaction, since many questions remain unanswered regarding the interaction between SARS-CoV-2 and FCoV and the result of coinfection by both viruses due to the close relationship between people and cats.

Furthermore, it is necessary to reflect on the "dirt factor" of cats. Individuals who are frequently exposed to antigens in the environment express molecular patterns associated with multiple pathogens that activate aspects of innate immunity. In other words, there is a stimulus of the innate immune receptors, raising the first line of defense of the organism (SEHRAWAT; ROUSE, 2020). In this respect, cat guardians seem to be less susceptive to the serious forms of COVID-19 because they are constantly in contact with the antigens present in the feline body.

Another influence that cats may have on human health as pets was addressed in a literature review on the positive effects mediated by the oxytocin system (BEET et al., 2012). In this study, it was found that interaction between human and animal can reduce the parameters related to stress, such as cortisol. Its reduction is significant for the immune system because this hormone is capable of suppressing leukocyte proliferation and activation, weakening the body's defenses against virus-infected cells, for example (FACCINI, et al., 2020). Therefore, contact with cats can lead to a reduction in cortisol, helping to strengthen the guardian's immune response.

Of the 1,239 respondents, 96.45% were already living with cats before the COVID-19 pandemic, and 65.86% also had contact with them outside of their residence. Thus, as 91.69% of the respondents claimed they were asymptomatic, it is plausible to consider the possibility that most of these cat guardians have an immune system that is better prepared to combat infections like the infection of SARS-CoV-2. It should also be evaluated that 61.50% of the respondents had contact with other animals, which raises questions about the well-being of humans in the context of COVID-19.

To conclude, the present study provides information indicating that cats can make their guardians less susceptible to the clinical consequences of COVID-19 as well as other infectious and non-infectious diseases , although much remains to be clarified regarding this recent illness in the history of humanity. Therefore, it is suggested that further studies should be conducted, including a comparative study between people who look after cats and those who do not live with these animals, both groups testing positive for COVID-19, in order to gain further insight into the theme in question.

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