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Life habits and food consumption after a COVID-19 pandemic in São Luís, Maranhão, Brazil

Hábitos de vida pos pandêmicos y consumo de alimentos de COVID-19 en São Luís, Maranhão, Brasil

Hábitos de vida e consumo de alimentos pós pandemia de COVID-19 em São Luís, Maranhão, Brasil

ABSTRACT

Objective: To describe life habits and food consumption during the COVID-19 pandemic in São Luís, Maranhão, Brazil. **Method:** Cross-sectional, descriptive study and quantitative approach. It was carried out with residents of the metropolitan region of São Luís. **Data collection** started after the participant's consent and online signature of the Free and Informed Consent Form. **Results:** 349 people participated, female (71,35%), mean age 29 + 10,8 years. As for life habits, there were: alcoholism (54,44%), smoking (4,01%) and physical activity (71,92%). The presence of COVID-19 was reported in 7,74% of the participants, while 27,51% reported suspicion. The consumption of nutrients for immunity before the pandemic was 56,16%, with the beginning of the pandemic it increased to 71,63%. The most consumed were vitamins C and D, lemon and its derivatives. **Conclusion:** It is concluded that the emergence of the pandemic increased the demand for nutrients and foods that can act on the immune system.

DESCRIPTORS: SARS-CoV-2; Pandemic; Quality of life

RESUMEN

Objetivo: Describir hábitos de vida y consumo de alimentos durante la pandemia de COVID-19 en São Luís, Maranhão, Brasil. **Método:** Estudio transversal, descriptivo y abordaje cuantitativo. Se llevó a cabo con residentes de la región metropolitana de São Luís. **La recolección de datos** se inició con el consentimiento del participante y la firma en línea del Formulario de Consentimiento Libre e Informado. **Resultados:** participaron 349 personas, mujeres (71,35%), edad media 29 + 10,8 años. **Encuanto a los hábitos de vida**, los reportes fueron: alcoholismo (54,44%), tabaquismo (4,01%) y actividad física (71,92%). **La presencia de COVID-19** se informó en el 7,74% de los participantes, mientras que el 27,51% informó sospecha. **El consumo de nutrientes para la inmunidad** antes de la pandemia fue del 56,16%, **con el inicio de la pandemia** aumentó a 71,63%. **Los más consumidos** fueron las vitaminas C y D, el limón y sus derivados. **Conclusión:** Se concluye que la aparición de la pandemia incrementó la demanda de nutrientes y alimentos que pueden actuar sobre el sistema inmunológico.

DESCRIPTORES: SARS-CoV-2; Pandemia; Calidad de vida.

RESUMO

Objetivo: Descrever os hábitos de vida e consumo de alimentos durante a pandemia de COVID-19 em São Luís, Maranhão, Brasil. **Método:** Estudo transversal, descritivo e abordagem quantitativa. Foi realizado com moradores da região metropolitana de São Luís. **A coleta de dados** foi iniciada após consentimento do participante e assinatura online do Termo de Consentimento Livre e Esclarecido. **Resultados:** Participaram 349 pessoas, sexo feminino (71,35%), idade média 29+10,8 anos. **Quanto aos hábitos de vida** os relatos foram: etilismo (54,44%), tabagismo (4,01%) e atividade física (71,92%). **A presença de COVID-19** foi relatado em 7,74% dos participantes, já 27,51% referem suspeita. **O consumo de nutrientes para imunidade** antes da pandemia era de 56,16%, **com o início da pandemia** passou a 71,63%. **Os mais consumidos** foram vitaminas C e D, limão e seus derivados. **Conclusão:** Conclui-se que o surgimento da pandemia aumentou a procura por nutrientes e alimentos que possam atuar no sistema imunológico.

DESCRIPTORIOS: SARS-CoV-2; Pandemia; Qualidade de vida.

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INTRODUCTION

CCOVID-19 (SARS-CoV-2) is in the family of coronaviruses and causes severe respiratory infections. The first case of the disease is reported in Wuhan, China on December 31, 2019.¹ Since January 2020, the World Health Organization (WHO) has classified the outbreak of COVID-19 as an International Public Health Emergency and, in March of that same year, a global pandemic.³ Other health entities in Brazil and South America agree that the pandemic is a serious concern for the Brazilian population.^{2,3}

The dissemination of COVID-19 occurs, mainly, through contact between individuals such as: handshake, saliva, sneeze, cough and phlegm. However, there may be contamination by objects or surfaces such as cell phones, tables, door handles, toys, computer keyboards, etc.⁴ The diagnosis is made by a health professional who assesses signs and symptoms and forwards them to molecular biological analysis (RT-PCR in real time) or immunological analysis (rapid test).⁵ In the absence of carrying out these analyzes, the diagnosis can be made considering a history of close or home contact, in the last 7 days before the onset of symptoms, with a laboratory confirmed case for COVID-19.⁶

With the advent of the pandemic in Brazil, alternatives for the prevention of COVID-19 have been researched, including food and lifestyle habits. Inappropriate use of food, nutrients and vitamin supplements can have health consequences.

According to the WHO, about 80% of those contaminated by COVID-19 do not have any symptoms, however 20% may need hospital care, and 5% may progress to a more severe form of the disease (requiring ventilatory support).² There is still no effective treatment for the disease. Prevention has been the social isolation recommended by several health entities.^{2,3,6} The abrupt change in routine can cause changes in lifestyle habits such as alcoholism, smoking and eating habits.

Healthy eating is essential for the prevention and treatment of various pathologies. With the global advance of the pandemic, food became the focus of studies of association in COVID-19 treatments. However, a lot of incorrect information and/or without scientific proof, also called fake News, is widespread in the Brazilian population. It should be emphasized that food is essential for maintaining health and essential for the immune system.^{7,8}

With the advent of the pandemic in Brazil, alternatives for the prevention of COVID-19 have been researched, including food and lifestyle habits. Inappropriate use of food, nutrients and vitamin supplements can have health consequences.⁹ It is essential to identify the changes in daily life provided by COVID-19. Since the beginning of the COVID-19 pan-

dem, health strategies have been largely oriented: practice of physical activity, decreased alcoholism and smoking and adequate nutrition. The aim of the study was to describe life habits and food consumption during the COVID-19 pandemic in São Luís, Maranhão, Brazil.

METHODS

This is a cross-sectional, quantitative study with a descriptive approach that aims to assess the impacts on lifestyle and nutrient consumption during the COVID-19 pandemic. Data collection was carried out in May 2020 with residents of the São Luís metropolitan region, which includes the municipalities of São Luís, Raposa, Paço do Lumiar and São José de Ribamar in Maranhão, Brazil. The entire research was carried out in a virtual manner, respecting the social isolation measures recommended by health entities.

The sample was non-probabilistic, for convenience. The inclusion criteria adopted were residents of the metropolitan region of São Luís and who had access to an electronic device with internet access to answer the online questionnaire. Exclusion criteria were people undergoing immunotherapy for cancer treatment or people undergoing hospitalization or those who refused to participate in the study.

The recruitment of the sample took

place online on social networks, where an image / invitation to participate in the study was presented. The research was widely disseminated by researchers on social networks (Instagram and Facebook) and messaging applications (WhatsApp) to search for candidates. Individuals considered eligible were invited to participate in the study. Then, the link to the Google Forms spreadsheet, previously edited by the research group, was sent. The beginning screen of the worksheet contained the Free and Informed Consent Term (ICF) with clear and accessible language and, virtually, it should be signed giving agreement to voluntary participation in the study. After consent, a signed copy of the ICF was sent by email to the respondent.

Participants answered the electronic questionnaire that contained open and closed questions. The data evaluated were sociodemographic, lifestyle, health and food status. The sociodemographic data evaluated were age, sex, and city of residence. As for life habits, alcoholism, smoking and physical activity were evaluated. Alcoholism and smoking were assessed for the presence of consumption before the pandemic, and when present increased, decreased and maintained consumption after the pandemic. The level of physical activity was not assessed, only the presence or absence of any physical activity was assessed before the pandemic and whether after the beginning

there was an increase or decrease in the frequency of physical activity.

The health situation was assessed by reporting comorbidities and the presence of COVID-19 in the respondent or in a resident of the same residence. Regarding food, the consumption of food, nutrients and vitamins was evaluated before and during the pandemic. The question related to the consumption of nutrients was opened, allowing the respondent to enter how many foods / nutrients he used for immunity before and during the pandemic.

The data were tabulated in the Microsoft Excel Software program. The numerical variables will be presented in mean and standard deviation and the categorical variables in absolute and relative numbers. Statistical analysis was performed using the Stata version 14.0 program, being considered statistically significant when $p < 0.05$. To analyze the association of categorical variables, the chi-square test was used. Student's t test was used to analyze numerical variables.

This project was initiated after submission and approval by the Research Ethics Committee of Centro Universitário UNDB (CEP-UNDB), under opinion number 4.046.556 and CAAE 32225120.0.0000.8707. All ethical research precepts were respected as determined by the Resolution of the National Health Council, Resolution 466/2012.

RESULTS

349 people participated in the study, with an average age of 29,31 + 10,8 years, with a predominance of females (71,35%), according to table 01. The metropolitan region of São Luís is formed by 4 municipalities (São Luís, São José Ribamar, Paço do Lumiar and Raposa). The capital of Maranhão, São Luís, had the largest number of participants (91,12%). The number of residents in the same household including the respondent was evaluated and the result was an average of 3,65 + 1,47 people per household.

Table 01. Sociogeographic profile of residents of the metropolitan region of São Luís during the COVID-19 pandemic

Variável		p valor
Idade (média+DP)	29,31+10,8	
Sexo - n (%)	Feminino 249 (71,35%)	0,907
	Masculino 100 (28,65%)	
Cidade atual - n (%)	São Luís 318 (91,12%)	0,415
	São José de Ribamar 22 (6,30%)	
	Paço do Lumiar 07 (2,01%)	
	Raposa 2 (0,57%)	
Quantidade média de moradores da residência –média+DP	3,65+1,47	

Source: Prepared by the authors, 2020.

Table 02. Alcoholism, smoking and physical activity of residents of the metropolitan region of São Luís during the COVID-19 pandemic

Variável	n (%)	p valor
1. Etilismo	190 (54,44%)	0,137
1.1 Durante a pandemia o etilismo:		
Aumentou	21 (11,05%)	
Diminuiu	123 (64,74%)	0,143
Indiferente	46 (24,21%)	
2. Tabagismo	14 (4,01%)	0,269
2.1 Durante a pandemia o tabagismo:		
Aumentou	3 (21,43%)	
Diminuiu	5 (35,71%)	0,453
Indiferente	6 (42,86%)	
3. Prática de Atividade Física	251 (71,92%)	0,110
3.1 Durante a pandemia o nível de AF:		
Aumentou	57 (22,89%)	
Diminuiu	142 (57,03%)	0,299
Indiferente	50 (20,08%)	

Source: Prepared by the authors, 2020.

Table 03. Health history of residents of the São Luís metropolitan region during the COVID-19 pandemic

Variável	n (%)	p valor
1. Presença de Comorbidades - n (%)	65 (18,62%)	0,597
1.1 Diabetes- n (%)	4 (6,15%)	0,597
1.2 Hipertensão- n (%)	13 (20,00%)	0,796
1.3 Problemas Cardíacos- n (%)	4 (6,15%)	0,597
1.4 Dislipidemia- n (%)	13 (20,00%)	0,796
1.5 Obesidade- n (%)	11 (16,92%)	0,351
1.6 Doenças Respiratórias- n (%)	12 (18,46%)	0,728
2. Diagnóstico de COVID-19- n (%)	27 (7,74%)	0,000
2.1 Média de dias de sintomas-(média+DP)	9,15+6,72	
3. Suspeita de COVID-19 - n (%)	96 (27,51%)	0,276
3.1 Média de dias sintomas-(média+DP)	8,58+6,40	
4. Morador da residência com COVID- n (%)	59 (16,91%)	0,001

Source: Prepared by the authors, 2020

Table 04. Consumption of nutrients for immunity by residents of the São Luís metropolitan region during the COVID-19 pandemic

Variável	n (%)	p valor
Consumo de nutrientes para imunidade antes da pandemia.	196 (56,16%)	0,002
Consumo de nutrientes para imunidade com o início da pandemia.	250 (71,63%)	0,461
Nutrientes Consumidos.		
Vitamina C	277 (79,37%)	0,203
Vitamina D	167 (47,85%)	0,665
Limão	217 (62,18%)	0,481

During the COVID-19 pandemic, lifestyle habits can be significantly influenced. Of the study participants, 54,44% are alcoholics. When assessing whether the pandemic caused changes in alcoholism, 11,05% reported that alcohol consumption increased (table 02). Smoking was present in 4,01% of those evaluated and, of these, 42,86% report that the smoking habit did not change with the pandemic. Physical activity was reported as frequent in 71,92% of participants, but 57,03% of those who practice activity reported that the level of physical activity decreased with the pandemic.

Health history has been an important ally in combating the new coronavirus, but the presence of comorbidities represents significant risks. The presence of at least one comorbidity was reported in 18,62% of the study participants (table 03). The most frequent comorbidities were: hypertension and dyslipidemia, both with 20% each. Respiratory diseases such as asthma, sinusitis, rhinitis and others were reported by 18,46%.

Only the exam can confirm the presence of COVID-19 and in that study 7,74% reported testing positive for COVID-19. The average time, in days, for symptom presentation was 9,15 + 6,72. Participants were also assessed who suspect contamination by COVID-19 because they had some characteristic symptom, but without diagnosis by examination. The data show that 27,51% suspect contamination and the average time of symptoms was 8,58 + 6,4 days.

In this study, it was assessed whether the participant used any nutrient for immunity before the COVID-19 pandemic and 56,16% said yes, according to table 04. With the beginning of the pandemic, the percentage increased reaching the mark of 71,63%.

As for the most common nutrients in use, the most frequent were: vitamin C (79,37%), lemon and its derivatives (62,18%), vitamin D (47,85%) and vitamin/multivitamin complexes (42,41%). The indication or prescription of these nutrients needs to be done by a qualified

Nutrientes Consumidos.	Alho	87 (24,93%)	0,293
	Glutamina	38 (10,89%)	0,009
	Prebióticos/probióticos	43 (12,32%)	0,007
	Mel de Abelha	129 (36,96%)	0,993
	Gengibre	94 (26,93%)	0,435
	Propolis	107(30,66%)	0,040
	Multivitamínicos	148 (42,41%)	0,150
Quem prescreveu/indicou o(s) nutriente (s)?	Médico	65 (22,29%)	0,569
	Nutricionista	31 (10,73%)	
	Amigo(a)	20 (6,92%)	
	Familiar	113 (39,10%)	
	Internet	32 (11,07%)	
	Outros	28 (9,69%)	

Source: Prepared by the authors, 2020.

health professional. In this study, most participants (39,10%) received a referral from a family member, followed by an internet search (11,07%) for the use of nutrients.

DISCUSSION

The accelerated growth of COVID-19 cases in Brazil⁶ and in the world² made the disease an international public health problem. The average age of this study was 29,31 + 10,8 years, a young audience. However, the elderly population is considered more susceptible to complications by COVID-19.¹⁰ The elderly have a longer hospital stay, greater need for intubation and unfavorable clinical outcomes such as death.¹¹ In addition to longevity, it is necessary to consider lifestyle habits such as alcoholism, smoking and physical activity.

The social isolation recommended by health entities^{2,3,6} can lead to disorders like alcoholism¹², smoking¹³ and sedentary lifestyle.¹⁴ The consumption of alcohol prior to the pandemic was reported by 54,44% (190) of the participants in this study, about 35,00% of whom reported that they increased or maintained the same consumption. Ingestion of alcohol, especially in high doses, increases the risk of serious infection by COVID-19 due to immune compromise, relationship

Of the practitioners of physical activities presented in this study, about 57,00% reported having decreased their practice with the beginning of the pandemic.

with comorbidities, deleterious effect on the liver, psychological decompensation and others.¹²

In addition to alcohol consumption, smoking has been a major concern. Despite the low smoking rate present in this study (4,01%), people who smoke or those who live with smokers are vulnerable to several pathologies, including COVID-19. The risks are related to respiratory health already compromised in this public and exacerbated in the face of COVID-19 infection, therefore, they may increase the risk of death.¹³ Respiratory health can be improved with physical activity.

Of the practitioners of physical activities presented in this study, about 57,00% reported having decreased their practice with the beginning of the pandemic. The reduction in practice can be associated with social isolation, which reduced access to physical activity centers and activities performed outdoors.¹⁴ Almost half of the study population reported a sedentary lifestyle. WHO has specific recommendations for physical activity for the population.²

The presence of comorbidity is a risk factor for COVID-19 infection.¹³ Approximately 18,00% of the participants in this study reported at least one, the most prevalent being hypertension, dyslipidemia, respiratory diseases, obesity and diabetes. In a recently published meta-analysis, which evaluated the presence of comorbidity in 1576 patients affected by COVID-19, the most prevalent were hypertension (21,1%, 95% IC: 13,0–27,2%) and diabetes (9,7%, 95% IC: 7,2–12,2%), followed by cardiovascular disease (8,4%, 95% IC: 3,8–13,8%) and respiratory system disease (1,5%, IC 95%: 0,9-2,1%).¹⁵

On June 2nd, 2020, Brazil has already exceeded more than 500 thousand confirmed cases of coronavirus.⁶ However, it is believed that the number of cases is underreported, the main reason being the absence of tests available to the population.¹⁶ The suspicion of contamination was reported by 27.51% of

the participants. This suspicion starts from the presentation of symptoms in the pandemic period. The main symptoms of COVID-19 are fever, dry cough, tiredness, pain and discomfort, sore throat, diarrhea and others.¹⁷ The average time of symptoms reported in the study in confirmed and suspected cases is 9,15+6,72 and 8,58+6,40 days, respectively. The average time of symptoms can reach 11,5 days.¹⁸ To minimize symptoms and, especially, to avoid COVID-19 feeding strategies are suggested by experts.⁷

During the pandemic, food care is of great importance, especially with regard to excesses and restrictions that may compromise the immune system.¹⁹ This study revealed that there was an increase in the consumption of food “for immunity” with the beginning of the pandemic and that the consumption of nutrients, before the pandemic, is related to the confirmed cases of COVID-19. The most consumed foods/nutrients were Vitamin C (vit. C), lemon, Vitamin D, vitamin complexes and honey.

The consumption of vit C proved to be the majority, either in its isolated form or with the lemon, rich in this nutrient. The win. C is an antioxidant capable of increasing subsets of T cells, improves lymphocyte response and increases interleukin-2 production, therefore acting on immune function.²⁰ Almost 50% of the participants in this study report consumption of vitamin D. Vitamin D can reduce the risk of infections, reduce the rates of viral replication and reduce the concentrations of pro-inflammatory cytokines, in addition to increasing the concentrations of anti-inflammatory cytokines.²¹ Recent evidence indicates that vitamin D supplementation may reduce the risk of infections and deaths from COVID-19.²² The consumption of vitamin complexes may be related to the search for other immunity benefits provided by vitamin E, zinc, selenium, among others.²⁰

The use of bee honey and propolis was reported by more than 30% of study par-

We confirm that there was an increase in the consumption of food and nutrients by the study participants with the onset of the pandemic. This consumption can bring significant benefits to the immune system. The consumption of nutrients before the pandemic, glutamine, prebiotics/probiotics and propolis showed an association in relation to the presence of COVID-19 confirmed by examination.

ticipants. Stingless bee honey can reduce the severity of pulmonary manifestations in COVID-19 infections.²³ A recent study points to the potential of flavonoids from propolis ethanol extracts to treat COVID-19.²⁴

Despite the diverse benefits of nutrients and foods for food19, it is important to note that almost 70% of the research participants were not guided by a medical professional or nutritionist. However, health and nutrition entities reinforce the importance of self-care with food⁷. And yet, there is no food or nutrient with guaranteed efficacy for the treatment of the new coronavirus, COVID-19.

CONCLUSION

The average age of the study participants revealed a young adult audience, however the population most vulnerable to infection is the elderly. Another situation of susceptibility to COVID-19 infection is inadequate lifestyle habits such as drinking, smoking and physical inactivity.

In addition to the risks of the group with bad life habits, it is important to pay attention to the public with comorbidities, as they are associated with unfavorable clinical outcomes. Diabetes, hypertension, heart problems and respiratory diseases increase the risk of death, and were the most present in this study.

We confirm that there was an increase in the consumption of food and nutrients by the study participants with the onset of the pandemic. This consumption can bring significant benefits to the immune system. The consumption of nutrients before the pandemic, glutamine, prebiotics/probiotics and propolis showed an association in relation to the presence of COVID-19 confirmed by examination.

Due to the temporal limitations and the impossibility of direct contact with the respondent for answers to the questionnaire, further studies are needed to clarify the questions that this research raised. ■

REFERENCES

- Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *The Lancet*. 2020; 395(10223):513-507. [https://doi.org/10.1016/S0140-6736\(20\)30211-7](https://doi.org/10.1016/S0140-6736(20)30211-7)
- World Health Organization – WHO. Corona virus disease 2019. Geneva: World Health Organization; 2020 [acesso 29 mai 2020]. Disponível em: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen>
- Pan-American Health Organization - PAHO. OMS afirma que COVID-19 é agora caracterizada como pandemia. Washington: Pan-American Health Organization, 2020 [acesso 29 Mai 2020]. Disponível em: <https://www.paho.org/en/documents/ongoing-living-update-potential-COVID-19-therapeutics-summary-rapid-systematic-reviews>
- Rothan HA, Byrareddy SN. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. *J Autoimmun*. 2020;109:102433. <https://doi.org/10.1016/j.jaut.2020.102433>
- Quintella CM, Quintella HM, Palma GB, Silva SCR, Silva GHR. Coronavírus (sars-Cov-2) e COVID-19: mapeamento de testes clínicos. *Cadernos de prospecção*. 2020; 13(2): 411-397. doi: <https://dx.doi.org/10.9771/cp.v13i2.COVID-19.36175>
- Ministério da Saúde (BR). Coronavírus Brasil. Brasília: Ministério da Saúde; 2020 [acesso 29 Mai 2020]. Disponível em: <https://covid.saude.gov.br/>
- Associação Brasileira de Nutrição (ASBRAN). Guia para uma alimentação saudável em tempos de Covid-19. Brasília: ASBRAN; 2020 [acesso 29 Mai 2020]. Disponível em: <https://www.asbran.org.br/storage/downloads/files/2020/03/guia-alimentar-covid-19.pdf>.
- Campos LF, Barreto PA, Ceniccola GD, Gonçalves RC, Matos LBN, Zambelli CMSF, et al. Parecer BRASPEN/AMIB para enfrentamento do COVID 19 em pacientes Hospitalizados. *BRASPEN J*. 2020;35(1): 5-3. doi:<https://doi.org/10.37111/braspenj.parecerbraspen2020>
- Madden JM, Shetty OS, Zhang F, Briesacher BA, Ross-DeGnan D, Soumerai SB, et al. Risk Factors Associated With Food Insecurity in the Medicare Population. *JAMA Intern Med*. 2020;180(1):147-144. doi:<https://doi.org/10.1001/jamainternmed.2019.3900>
- Liu K, Chen Y, Lin R, Han K. Clinical features of COVID-19 in elderly patients: A comparison with young and middle-aged patients. *J Infect*. 2020; 80(6):18-14. doi:<https://doi.org/10.1016/j.jinf.2020.03.005>
- Liu W, Tao ZM, Lei W, Yuan ML, Liu K, Zhou L, et al. Analysis of factors associated with disease outcomes in hospitalized patients with 2019 novel coronavirus disease. *Chin Med J*. 2020; 133(9):1038-1032. doi: <https://doi.org/10.1097/CM9.0000000000000775>
- Da BL, Im GY, Schiano. COVID-19 Hangover: A Rising Tide of Alcohol Use Disorder and Alcohol Associated Liver Disease. *Hepatology*. 2020. doi:<https://doi.org/10.1002/hep.31307>
- Volkow ND. Collision of the COVID-19 and Addiction Epidemics. 2020. doi: <https://doi.org/10.7326/M20-1212>
- Hammami A, Harrabi B, Mohr M, Krstrup P. Physical activity and coronavirus disease 2019 (COVID-19): specific recommendations for home-based physical training, Managing Sport and Leisure. doi: <https://doi.org/10.1080/23750472.2020.1757494>
- Yang J, Zheng Y, Gou X, Pu K, Zhaofeng C, Guo Q, et al. Prevalence of Comorbidities and Its Effects in Patients Infected With SARS-CoV-2: A Systematic Review and Meta-Analysis. *Int J Infect Dis*. 2020; 94(1): 95-91. doi:<https://doi.org/10.1016/j.ijid.2020.03.017>.
- Dias GH, Souza CDS, Bezerra MR, Peixoto FS. Análise da distribuição espacial da covid-19 e subnotificação de casos novos e óbitos no estado do Rio Grande do Norte, Brasil. *Revista Pensar Geografia*. 2020;3(2):67-51. doi: <https://doi.org/10.26704/rpgeo>
- Wimalawansa, S.J. Global epidemic of coronavirus--COVID-19: What we can do to minimize risks. *Eur. J. Biomed. Pharm. Sci*. 2020;7(3):438-432. https://www.ejbps.com/ejbps/abstract_id/6656
- Lauer AS, Grantz KH, Bi O, Jones F. The Incubation Period of Coronavirus Disease 2019 (COVID-19) From Publicly Reported Confirmed Cases: Estimation and Application. *Ann Intern Med*. 2020;172(9):582-577. doi: <https://doi.org/10.7326/M20-0504>
- Muscogiuri G, Barrea L, Savastano S, Colao A. Nutritional recommendations for CoVID-19 quarantine. *Eur J Clin Nutr*. 2020. doi:<https://doi.org/10.1038/s41430-020-0635-2>
- Chandra RK. Effect of vitamin and trace-element supplementation on immune responses and infection in elderly subjects. *Lancet*. 1992;340(8828):1124-7. doi: [https://doi.org/10.1016/0140-6736\(92\)93151-c](https://doi.org/10.1016/0140-6736(92)93151-c).
- Gruber-Bzura BM. Vitamin D and Influenza-Prevention or Therapy? *Int. J. Mol. Sci*. 2018;19(8):25-1. doi:<https://doi.org/10.3390/ijms19082419>
- Grant WB, Lahore H, McDonnell SL, Baggerly CA, French CB, Aliano JL, et al. Evidence that Vitamin D Supplementation Could Reduce Risk of Influenza and COVID-19 Infections and Deaths. *Nutrients*. 2020;12(4):19-1. doi:<https://doi.org/10.3390/nu12040988>
- Mustafa MZ, Shamsuddin SH, Sulaiman SA, Abdullah JM. Anti-inflammatory properties of stingless bee honey may reduce the severity of pulmonary manifestations in COVID-19 infections. *Malays J Med Sci*. 2020;27(2):169-165. doi:<https://doi.org/10.21315/mjms2020.27.2.17>
- Guler HI, Tatar G, Yildiz O, Belduz AO, Kolayli S. Investigation of potential inhibitor properties of ethanolic propolis extracts against ACE-II receptors for COVID-19 treatment by Molecular Docking Study. *ScienceOpen*. 2020. doi:<https://doi.org/10.14293/52199-1006.1.SOR-PP5BWN4.v1>