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Digital influencers and the spread of irrational drug use

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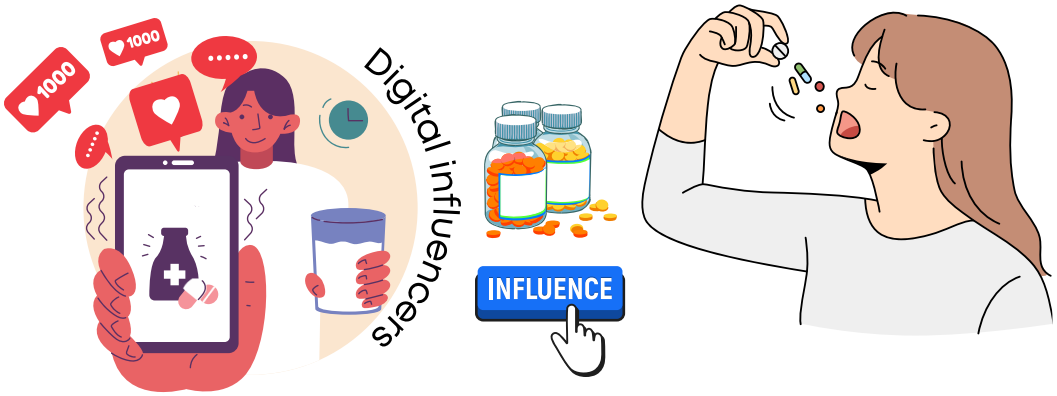
Abstract
The figure of the digital influencer has become fundamental within social networks in reaching the consumer public market since it determines the direction of its thousands and even millions of followers. As a consequence of this whole range of influence, companies, brands, and industries from the most diverse branches began to establish partnerships for advertising and publicizing their products in the field of beauty, food, fashion, and, mainly, health, for example, corroborating with self-medication. Digital Influencer refers to an individual who is a reference and who has the power to influence his followers, managing to increase sales of the product he promotes. Because of the above, the methodology adopted was descriptive, exploratory, and observational, with a cross-sectional design, through the application of a semi-structured questionnaire. This study aims to evaluate digital influencers and their strategies that increase the risk of irrational drug use by students of undergraduate courses in the health area. As for the results obtained from the collected data, it was found that most of the respondents were female; the age of participants in the samples ranged from 17 to 48 years. Regarding the irrational use of medication, the majority, 90.8% (n = 128), claimed to know the subject, and 75.7% (n = 109) stated that influencers generally suggest some medication with the purpose of self-medication. About using medication due to digital influencers, 73.2% (n = 115) claimed not to use medication recommended by “influencers.” Finally, it can be seen that the present research that the analyzed theme demonstrated the complexity and the need to have a follow-up of the supervisory bodies about what is produced by influencers in social networks, above all, in the field of self-medication, since it became Of course, the use of drugs without proper authorization from the professional is dangerous and may cause irreversible damage.

Keywords: Digital influencer, health graduates, self-medication, regulatory agencies.

Graphical Abstract



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1. Introduction

According to the World Health Organization (2012), the irrational use of medicines involves some behaviors: inappropriate use of pharmacological classes, simultaneous use of several medicines, and inappropriate medical prescriptions. Within this worrying scenario, the pharmacist's contribution becomes extremely important for the rational use of medicines to avoid major disorders in patients' health.

Aquino (2008) states that in Brazil, at least 35% of the medicines obtained by the consumer are used through self-medication. An enormous gravity emerges from these data since the risks are great, and the consequences can be deadly, depending on the drug used in self-medication.

Bearing in mind that the inappropriate use of medication without medical-professional knowledge is expanding, Barreto (2019) points out that it is important to observe and report examples such as the number of people who store medications left over from previous treatments at home and simply take medication, even after applying it within the time specified in the prescription.

In this sense, it is valid to state that all professionals play an essential role within their area of expertise, which is no different from the pharmacist. In the words of Soterio and Santos (2016), pharmacists have a fundamental role in guiding the population to the correct use of medicines. In addition to being specialized in different areas such as pharmacology, hospitals, clinical analysis laboratories in pharmacies, and drugstores, they are responsible for guidance and safe dispensing. The work of pharmaceutical care with the population during drug dispensing is very important.

It is worth mentioning that the indiscriminate use of drugs is becoming more common every day, thus causing an increase in cases of toxicity and adverse reactions and, consequently, an increase in morbidity and mortality due to improper pharmacotherapy. In addition to being a public health problem, all this generates a high cost for the public health system, which can be avoided (Melo et al., 2021).

Vilarino et al. (1998) state that the accumulation of general knowledge is one of the reasons for self-medication, which is why there is a high rate of this type of conduct by university students in the health area, as well as by ordinary people who end up listening to the reports of family members. or people close to you that such a medication worked well, even with enough knowledge to know that it carries health risks to the point of causing death. These people almost always have a behavior determined by digital influencers who are not mostly knowledgeable about pharmacology but are just promoters or marketers who use social media publications to 'sell an image.'

Drug advertisements have been a stimulus for the irrational use of drugs, as only their benefits are highlighted, while the risks and possible adverse effects are omitted or minimized, causing the consumer to use the drug as any commodity, which is why they are using it. Big names on the internet publicize this type of product (Aquino, 2008).

The newest ally for communication today is digital marketing, breaking down barriers and enhancing the reach and results of companies. Hence, a new fashion arises, where popular individuals on social networks who can influence their followers through their posted content become "digital influencers," or they can be actors, YouTubers, bloggers, and media personalities. "Digital influencers" can provoke, inspire, and influence the way of life of thousands of people, and because they are easy and light, they expose brands and products spontaneously (Felix, 2017).

Cardoso (2016) emphasizes that companies saw the digital environment as a way to advertise their products, which could be the hiring of media personalities, actors, and bloggers, among others, on the brand's direct pages. Digital Influencer refers to an individual who is a reference who has the power to influence his followers and manages to increase sales of a product he promotes.

In this context, the pharmaceutical industry and entrepreneurs see a way to increase sales with digital advertising, directly influencing their target audience. Even though drug advertising is subject to specific rules, it is worth noting that these are not always respected, and so is inducing the indiscriminate use of medicines. The fact that health professionals do not control this information is worrying, given that the population is increasingly connected to the virtual world.

To this extent, this study aimed to evaluate digital influencers and the practice of irrational use of medicines among university students in the health area. The persuasion strategies in promoting the

irrational use of medicines, student profile, and medications were also surveyed.

2. Materials and Methods

This is a descriptive, exploratory, observational study with a cross-sectional design through the application of a semi-structured questionnaire. A structured interview questionnaire will be applied to students in the areas of knowledge of health sciences to measure the irrational use of medicines due to the influence of digital influencers.

The following variables will be evaluated: socio-economic data and medication used by digital influencers' suggestions from the social media: Instagram®. Regarding the drugs used, the following variables were investigated and discussed: sources of information, drugs, therapeutic indication, digital influencers, and irrational use of drugs.

The studied population consisted of male and female students enrolled at Centro Universitário UniAges, belonging to the health area, who meet the following inclusion criteria: accepting to participate in the investigation, signing a Term of Free and Informed Consent (TCLE), using social media, in addition to monitoring digital influencers.

As exclusion criteria: a student who previously attended another higher education institution and/or not having signed the free and informed consent form. The interviews were carried out from March 10 to April 20, 2021. The aforementioned criteria, both inclusion, and exclusion, outlined the directions, objectives, and methodology to be taken by the present work.

Initially, an invitation was sent by email and WhatsApp® to participate in the research, and, in case of acceptance, the participant received the Free and Informed Consent Form (TCLE), the questionnaire in Word for Windows® format, and the link to access through Google Forms. In addition, access to video conferencing was made available to assist in possible difficulties related to filling in the documents sent.

The type of sampling chosen for this study was non-probabilistic. In this sense, the sample chosen will be for accessibility or convenience. Convenience sampling is adequate and frequently used to generate ideas in exploratory research such as this one. Finally, in this type of sampling, the researcher deliberately chooses what he wants to be part of his research, *i.e.*, criteria and value indices.

This study was submitted to the Ethics and Research Committee of Centro Universitário UniAges - BA. Thus, all students agreeing to participate in the study were informed in advance about the goals and nature of the research, signing an informed consent form by Resolution CNS nº 466/12 (Brasil, 2012). In this way, the students submit to the ethical dictates involved in the research. With all this, the subject of our research was aware of the essence of the work presented here, in addition to committing to follow the basic principles of ethics followed by this research in its trajectory.

A script was prepared to be tested in a pilot study. After the precise and necessary adjustments and revisions, the interviews were carried out with the students of the respective courses who study at the same institution of higher education, as the intention is to verify a certain profile.

Quantitative data were entered into a separate Microsoft Office Excel spreadsheet and analyzed using descriptive statistics (Epidat version 3.1, Organización Panamericana de la Salud OPS/OMS).

3. Results and Discussion

Most respondents were female 74.8% (n = 110) and 25.2% (n = 37) male (**Fig. 1a**). The age of participants in the samples ranged from 17 to 48 years, with a mean (μ) = 24.84 participants and standard deviation (σ) = 6.23.

When asked whom they turn to, doubts about the medications used 45.9% (n = 67) resort to the internet, 28.8% (n = 42) to pharmacists, 21.2% (n = 31) to doctors, and 4.1% (n = 6) by relatives and friends (**Fig. 1b**). The graph below shows the potential that the internet has to influence people.

Regarding the profile of the interviewees, the most significant participation was of Pharmacy students, with a total of 38.6% (n = 56) of the participants (**Table 1**), although there was significant participation of students from various other courses such as Physiotherapy (12.4%) and Nursing (11.7%).

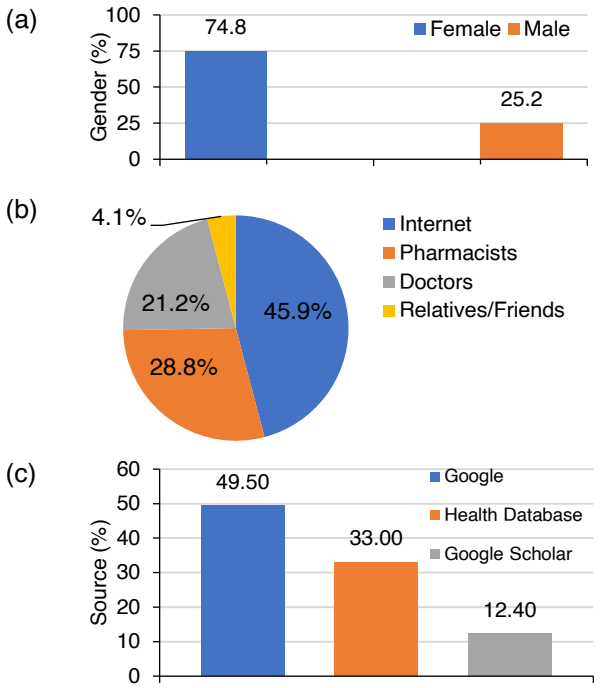

Fig. 1 Gender of participants (a), information sources on pharmacotherapy (b), and online research sources about medicines mentioned by the interviewees (c).

Table 1 Percentage of interviewees, according to the evaluated course, corresponding to the total number of individuals who participated in the survey.

Undergraduate Course	N	%
Pharmacy	56	38.6%
Physiotherapy	18	12.4%
Nursing	17	11.7%
Veterinary Medicine	14	9.7%
Medicine	13	9%
Psychology	8	5.5%
Nutrition	7	4.8%
Dentistry	7	4.8%
Biological Sciences	4	2.8%
Physical education	1	0.7%

Concerning research sources on medicines, 49.5% (n = 48) reported using Google, while 33% (n = 32) of respondents use specialized health databases, which they did not identify, and 12.4% (n = 12) use Google Scholar (**Fig. 1c**).

When assessing the level of information acquired on the topic "health," only 7.4% (n = 11) answered that they did not know, 32.4% (n = 48) chose the option maybe, and 60.1% (n = 89) claimed to know (**Fig. 2**).

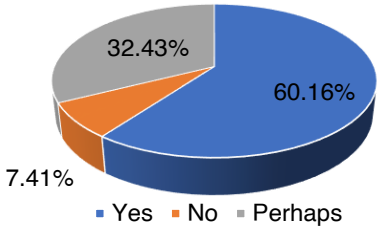

Fig. 2 Level of information (%) on the health of the participants interviewed in the survey.

Regarding the irrational use of medication, the majority, a total of 90.8% (n = 128), claimed to know the subject, and only 9.2% (n = 13) were unaware of the subject. Regarding adverse reactions caused by medication use, 82.5% (n = 118) are aware of the potential risks and damage it can cause to health, while 17.5% (n = 25) are unaware, which makes this group high risk.

Among the interviewees, 75.7% (n = 109) state that influencers generally suggest some type of medication, while 24.3% (n = 35) report a lack of knowledge about the practice of indication by influencers (**Fig. 3a**). The aforementioned data is extremely worrying because, first, they are influenced subjects who 'know' the dangers of self-medication, but who, second, continue in the irresponsible, harmful, and unprofessional practice indicated by the influencers.

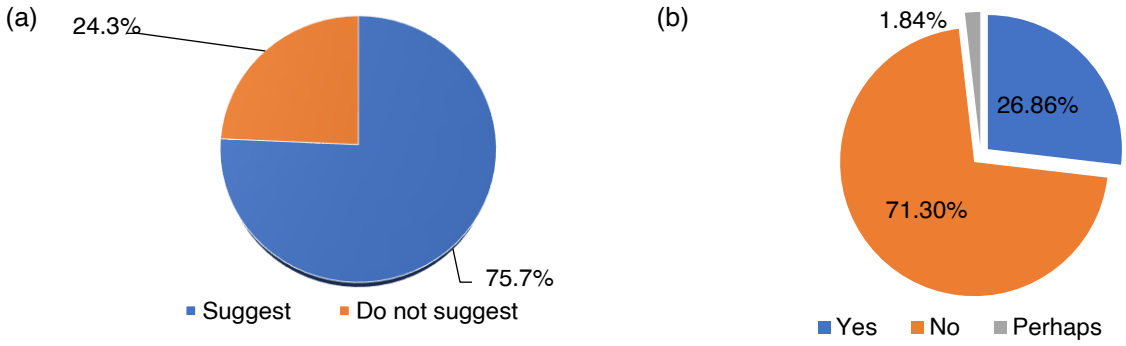

Fig. 3 Drug suggestion (a) and (b) the use of medications indicated by influencers reported by research participants.

Regarding the habit of using medication, 71.3% (n = 115) claimed not to use those indicated by influencers. However, about 26.86% (n = 39) answered that they consume medication suggested by them (**Fig. 3b**). Examples of such medications are shown in **Table 2**.

Table 2 Medicines suggested by influencers most cited by research participants.

Drugs	Indications	Report in the literature	Source
Naara® collagen	Skin, nails, and cellulite	Treatment of osteoporosis and osteoarthritis symptomatic relief in pain conditions.	Porfírio & Fanaro (2016)
Creatine	Muscle mass gain	Increases total, fat-free body mass.	Peralta & Amancio (2002)
Hipoglós®	Skin (dark circles)	Treatment of diaper rash, dermatitis	Janssen-Cilag Farmacêutica Ltda.
Gummy Hair	Hair and nails (growth and strengthening)	Accelerates recovery and inhibits its regression, prevention of alopecia.	Cruz et al. (2020)
Minoxidil	Hair (growth and fall)	Treatment of androgenic alopecia (hereditary baldness) in adult men	Aché Laboratórios Farmacêuticos
Sodium diclofenac	Muscle pain	Arthritis, back pain, frozen shoulder syndrome, tennis elbow, gout flare-ups; sprains, strains, and other injuries; pain and swelling after surgery; painful inflammatory conditions in gynecology, including menstrual periods.	EMS Pharma
Tea SB[1]	Slimming	Not described	Not described
Slim Caps[2]	Slimming	Not described	Not described
100PESO[3]	Slimming	Not described	Not described

Tea SB[1]= Porangaba, centella asiatica, horsetail, chamomile, carqueja, lemongrass, and parsley (*Cordia ecalyculata*, *Centella asiatica*, *Cassia angustifolia*, *Equisetum arvense*, *Chamomilla recutita*, *Baccharis articulata*, *Cymbopogon citratus* and *Petroselinum crispum*). Slim Caps[2] = chlorella, morosil, ginger, psyllium, and eggplant. 100PESO[3] = chitosan, psyllium, spirulina, ascorbic acid (vitamin C), retinyl acetate (vitamin A), chromium picolinate, and maltodextrin (vehicle).

Concerning the knowledge about the practice of using medication at the recommendation of influencers among family members, friends, or acquaintances, 77.9% (n = 88) said they knew someone who uses medication at the indications of digital influencers. On the other hand, 22.1% said they did not know anyone under that influence (**Fig. 4**). In addition, 86.8% (n = 125) of participants report that they do not think it is correct for influencers to address the topic, and 13.2% (n = 19) claimed no problems.

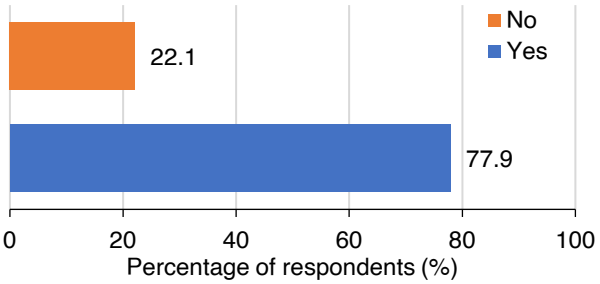

Fig. 4 Habit of medication use under the influence of digital influencers.

Geraldini and Brandi (2018) vehemently state that communication has undergone several changes, from writing to technological advancement to the digital world. This technological world, which gave rise to countless interactions and personalities, has become a space in which multiple and varied types of opinions, information, and guidelines are disseminated at the speed of a click after an interactive look.

Because of this, the constant interaction on the internet interferes with the opinion of its users regarding all possible subjects since the world wide web shares ideas and information formats that captivate and lead people.

With the largest number of internet accesses and the freedom to post whatever they want, as it has all kinds of information easily and practically, it is currently the biggest source of searches for everything, as demonstrated by this research. , in particular, on issues related to health, well-being, the treatment of certain diseases, and even self-medication, making the network a gigantic virtual doctor's office. This "office" is predominantly sought after by students of Pharmacy but also of Physiotherapy and Nursing in search of self-medication 'tips.'

Social networks are currently a tool for sharing, supporting, and informing about varied topics such as, for example, health care through medication indications for use by people (digital influencers) who do not always have academic-professional training, as was also proven and revealed in the data collected by this work. Consequently, this generates situations where digital influencers place themselves in a position of power and dominance over a given subject, even without having it.

As Felix (2017) states, the internet has changed how customers interact with companies, how they buy, and how they relate to other consumers. Currently, a merger between people and organizations is happening instantly and, in a way never seen before in society. The whole context makes an individual start to stand out on the web and gain many followers.

Because there is no adequate inspection, not all information found on the internet and social networks is accurate and, therefore, does not deserve credibility; that is, most of it is false (fake news), thus

causing great consequences such as the risk of death or worsening of the users' illness, in addition to affecting trust between patients and health professionals, inducing, in a way, self-medication (Istoe et al., 2019).

According to Almeida et al. (2018), on Instagram, influencers are individuals who form opinions and have a large number of followers on their profiles. Its reach began with the fashion department; however, it has expanded to all areas, so today, these profiles advertise all types of products, services, and guidelines.

These opinion makers, called influencers, have the power to influence other people through their disclosures and posts. This type of digital marketing has facilitated and expanded how companies connect with their potential consumers.

This entails consolidation since "all companies struggle to establish a solid brand – that is, a strong and favorable brand image" in their partnership and firm with their customers - several influencers from the most varied commercial niches, including the medical-pharmacological.

Regarding the role of digital influencers, Felix (2017) highlights that these professionals can transmit content authentically and daily. Influencers post photos and videos on their social media profiles and tag companies in posts, and that is it. The customer is forwarded directly to the brand's profile or the organization's virtual store.

The influencer is, finally, a vehicle that brings companies/products closer to their consumers because, generally, they are people who transmit much confidence to those who follow them, and, through this reliability, everything they announce is well received by the consumers, thousands, maybe millions of followers.

In the conception of Adolpho (2011), "digital marketing becomes a strategy, and the virtual one approaches the reality of companies," and virtual marketing through digital influencers directly reaches the consumer target audience.

For Cardoso (2016), "Digital Influencers end up becoming sorts of leaders who dictate the trends to be followed by their audience. They become an example for their followers, who [...] begin to "dictate" models to be copied."

Since there are many social networks currently existing, such as Facebook, YouTube, WhatsApp, Instagram, Twitter, Pinterest, Snapchat, and LinkedIn, and in all of them, there are influencers who work tirelessly to 'sell' products to satisfy the desires of the followers, it is not surprising that the aforementioned social media are a source instrument that determines the desires of those influenced, even in terms of self-medication by people who are 'knowledgeable' in the area of health. With the function of interacting, communicating, and informing a large number of users, new advertising tools are constantly launched to always propose to network users improvement, agility, ease, and satisfy the needs of society.

Felix (2017) and Almeida et al. (2018) state that advertising made by digital influencers can be done for all types of audiences and markets; someone can find professionals who stand out with work in various niches such as sports, fashion, and beauty, decoration, technology, and behavior. In addition, nowadays, social networks are seen as a source of income for people who often post their daily lives and thus call themselves digital influencers, seeking partnerships with companies in exchange for barter and payments for mass-produced marketing.

Companies adhere to this new strategy due to the large number of people reached in real-time (Andrade et al., 2018) and the enormous amounts raised by media platforms quickly and efficiently. This means easy publicity for the product, a media professional, and countless followers willing to buy any product (even an info-product) just because the influencer indicates it he follows. It is worth mentioning that if the influencer is from the health field, its acceptability and reliability increase exponentially because it is someone who 'dominates' its area of activity in social networks.

As a result of the strong media appeal of digital influencers, currently, in the health area, research on the internet has been taking up space, making the patient self-diagnose and consequently self-medicate on the freeway, as presented on the world wide web.

Based on this, it is necessary to relate the importance of coherent information, its usefulness and viability, and the role of companies and influencers that disseminate or inform about health and medicines, aiming at controlling the irrational use of medicines and the problems they entail (Lima, 2016). Gomes and Gomes (2017) define it very well: "Digital influencers create and distribute diverse

content in multiple media, structuring them in a transmedia narrative."

In the face of these discussions and reflections, Abjaude et al. (2020) point out that users are daily presented with fake news that is false information as if they were true, thus generating impactful problems. With fake news, public opinion is manipulated through a fake news scheme that benefits those who spread it. However, it causes a lot of damage to those who adopt it since the lack of genuine information causes losses.

Influencers need to help reduce this problem, producing content that adds value and is true, filtering content, especially regarding health, on the threshold between the well-being of body and mind and the irresponsibility of information passed on from an unfair way to the followers.

According to Pereira et al. (2007), self-medication occurs in several ways in which the individual decides to take medication without evaluation or monitoring by a health professional, sharing medications and leftover prescriptions with the close social cycle and family members.

Vilarino et al. (1998) say that the irrational use of medication entails several consequences for the user, as no medication is innocuous to the body. It is noteworthy that momentary and instantaneous relief hides symptoms and increases the risk of aggravation of the disease, and generates possible adverse reactions, addictions, and intoxications.

Gomes (2016) says that the media highly indicate the use of herbal medicines, as they claim that there are no adverse reactions, which is a great myth, stating that herbal medicines are obtained from plant derivatives and, therefore, are entirely harmless. The fact that these drugs are intended to cure, have been used for many years, and are natural does not exempt them from toxicities.

Since most of the participants in this research are female, it is worth mentioning that current scientific surveys indicate that women seek more health information to prevent and save on treatments, while men are very little concerned. It is clear that a large part of the population seeks information about health on the internet, and it is worth noting that not all information found in research sources is reliable (Gomes, 2012; Borges et al., 2014).

Detecting sources of information for adolescents and young people is essential to provide them with quality information, including about health. With more information and greater access to the network, the current generation needs to develop the ability to critically assess the quality of information since there is a lot of "fake news" disguised as truthful information and great utility for the target audience of social networks.

It should also be noted that the use of the internet has become indispensable for obtaining information because it allows them to be accessed in real-time and anywhere in the world simply by synchronizing all the data in the search focus on the network (Silva et al., 2016).

Knowing that the first results found on Google are usually represented by the number of searches for a given topic, it is easy to see which are the most sought-after. Google tool is currently the most popular information search engine on the internet, through which it is possible to show how the internet and the cyberculture linked to it are changing and facilitating access to information sources in academia (Azevedo, 2008). Due to the great demand for information and to maintain the organization, research sources created an information system to easily offer accurate and reliable information (Moura et al., 2019).

According to Garcia and Duarte (2020), the excess of information, which is often conflicting, is an obstacle to essential information for guiding the population and makes decision-making difficult for managers and professionals.

In this research, there was a greater participation of Pharmacy students, with 38.6%. It was also possible to perceive that the indiscriminate use of medicines affects all social classes. However, the biggest supporters are those who have a greater degree of information. Because they have in-depth knowledge of pharmacodynamics and pharmacokinetics, pharmacy students have a high rate of self-medication (Barreto, 2019).

Knowing that digital influencers are individuals with the power to form opinions, thus becoming an alternative for companies to promote their products to a specific target audience, it is possible to attract new consumers based on this strategy. As this is a new concept of innovation, the communication flow between opinion leaders and

followers (Almeida et al., 2018) expands and reaches other frontiers in digital marketing.

Given the above, it is important to highlight that emotionally and socially fragile individuals are easily influenced by the pharmaceutical market, and the digital influencer can corroborate the irrational use of medicines, given the vulnerability of this type of consumer (Arrais et al., 2016).

For Andrade et al. (2018), people are increasingly connected to social networks, and the market is constantly updating this involvement to attract more new consumers with greater force, investing in new capture tools. The market approaches social networks daily to reach thousands of people quickly, creating yet another marketing strategy (Andrade et al., 2018).

Macedo et al. (2016) highlight that self-medicating can cause irreversible damage to health or even mask symptoms of more severe illnesses. Advertisements end up promoting self-medication, an ancient and dangerous practice, to the category of reliability because of the work profile of digital influencers.

Finally, Castro et al. (2013) point out that it promotes the masking of diseases, leading to late diagnoses or even changing the diagnosis and delay in treatment, possible drug interactions, intoxications, and some side effects. The authors also warn that the indiscriminate use of medication is worrying, as more than 10% of hospital admissions are due to adverse reactions caused by self-medication.

4. Conclusion

Analyzing the data presented in the survey, it was possible to verify the power of persuasion of influencers on their target audience, corroborating with the growth of self-medication, making it possible to infer and verify the need for investigation and surveillance of state health agencies in social networks, preventively. It also became clear that searching for information from an unreliable source can lead to the irrational use of medication, which leads to severe damage in the context of the disease. As demonstrated by this work, the increase in false or incomplete information obtained naturally and reliably, combined with a lack of knowledge, is causing risks to the population's health. The theme analyzed by this work demonstrated the complexity and the need for awareness of individuals who call themselves digital influencers and brands that only aim at a profit since the risks that the use of medicines indicated without criteria can be irreversible. The field for analysis and research in the segment of influence in social networks is wide. As it is a recent topic, there are few studies with this approach. Therefore, more research is needed to evaluate this practice and allow the development of strategies for rational use in this digital age.

Authors' Contributions

Conceptualization, N.D.S.J., A.A.S.R. and M.P.S.S.; Methodology, N.F.O., and L.A.A.; Investigation, N.D.S.J. and J.B.J.; Formal Analysis, A.A.S.R. and M.P.S.S.; Writing – Original Draft, G. S. F., and L.A.A.; Writing – Review & Editing, N.D.S.J., A.A.S.R. and M.P.S.S. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

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