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### ARTICLES ON DRUGS IN THE SPANISH PRESS: HOW MUCH INFORMATION AND WHAT TOPICS MAKE THE NEWS?

### ARTÍCULOS SOBRE FÁRMACOS EN LA PRENSA ESPAÑOLA: ¿CUÁNTA INFORMACIÓN Y QUÉ TEMAS SON NOTICIA?

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## ABSTRACT

News about drugs is important for health professionals, businesses, and the general public. However, studies examining news articles about drugs are lacking. This paper uses content analysis to examine articles about drugs in 17 Spanish newspapers (13 general, two business, and two professional) from 2008 through 2017. On average, general and business newspapers published three articles about drugs every week, and professional newspapers published 14 every week. Overall, the number of articles about drugs decreased by 10%. The most covered drug-related topics in 2017 were cancer and generics; the least covered was preclinical research. Four times more articles were published on clinical than on preclinical research. Business newspapers published more about clinical and preclinical research than other types of newspapers. Articles about drugs accounted for 0.5% ( $n=838/178,926$ ) of all articles in the general newspapers, 0.8% ( $n=468/55,800$ ) in the business newspapers, 8.5% ( $n=415/4,856$ ) in the medical newspapers, and 1.2% ( $n=19/1,645$ ) in the science news agency SINC. This study used a new strategy to search and identify newspaper articles through content analysis of large volumes of information and offered relevant data to guide future research.

## KEYWORDS

*Drugs; Medications; Newspapers; Press; Science communication; Journalism; Content analysis.*

## RESUMEN

Las noticias sobre fármacos son importantes para los profesionales de la salud, las empresas y el público general. Sin embargo, faltan estudios que analicen los artículos periodísticos sobre fármacos. Este trabajo utiliza el análisis de contenido para examinar los artículos sobre fármacos en 17 periódicos españoles (13 generalistas, dos económicos y dos profesionales) desde 2008 hasta 2017. En promedio, tanto los periódicos generalistas como los económicos publicaron tres artículos sobre fármacos cada semana, mientras que los profesionales 14 cada semana. En conjunto, el número de artículos sobre fármacos disminuyó un 10%. Los temas relacionados con fármacos más cubiertos en 2017 fueron el cáncer y los genéricos; el menos cubierto fue la investigación preclínica. Se publicaron cuatro veces más artículos sobre investigación clínica que sobre investigación preclínica. La prensa económica publicó más sobre investigación clínica y preclínica que otros tipos de prensa. Los artículos sobre fármacos representaron el 0,5% ( $n=838/178.926$ ) de todos los artículos de la prensa general, el 0,8% ( $n=468/55.800$ ) de la económica, el 8,5% ( $n=415/4.856$ ) de la profesional médica y el 1,2% ( $n=19/1.645$ ) de la agencia de noticias científicas SINC. Este estudio se ha realizado con una nueva estrategia para buscar e identificar artículos de periódicos mediante análisis de contenido de grandes volúmenes de información y ofrece datos relevantes para orientar futuras investigaciones.

## PALABRAS CLAVE

*Fármacos; Medicamentos; Periódicos; Prensa; Comunicación científica; Periodismo; Análisis de contenido.*



## 1. INTRODUCTION

Together with health professionals, the media are an important source of information on health and drugs<sup>1</sup> (Chen & Siu, 2001; Grilli et al., 2002). With some cultural differences between the East and West, the media and internet are even more relevant than health professionals (Song et al., 2016). The influence of the media on health literacy also affects beliefs about drugs and individual medical decisions (Federman et al., 2013; Duggan et al., 2014; Kale et al., 2015).

Research on the use of traditional media for informing the public about drugs is abundant, but partial and often inconsistent, and has focused mainly on the written press (Catalan-Matamoros & Peñafiel-Saiz, 2017). Most studies of the media's reporting on drugs have focused on newspapers, usually at a particular point in time, although some studies have also considered television news stories (Schwitzer, 2008; Barry et al., 2012), and most are limited to sources within a single country. Pharmacology and drug-related topics offer multiple examples of the press's role in the dissemination of science (Bosch & Serés, 2015).

### 1.1. QUALITATIVE STUDIES

One meaningful way of studying this role has been analyzing the quality of newspaper articles on drugs. Most of these studies have been conducted in Australia (Wilson et al., 2009), Canada (Cassels et al., 2003), the United Kingdom (Robinson et al. 2013), and above all the United States, (Moynihan et al., 2000; Klotz & Ceccoli, 2005; Schwitzer, 2008, 2012, 2015; Saitz & Schwitzer, 2020).

These studies showed that news articles are usually incomplete and fail to discuss the level of certainty of the evidence, costs, alternative options, conflicts of interests, or magnitude of potential benefits and harms of drugs. Other studies have highlighted the lack of information on the financing of drug research by pharmaceutical companies (Hochman et al., 2008). The incompleteness and poor quality of news on drugs is related with the complexity of this information (Casino, 2007). Another related factor is that press releases from pharmaceutical companies do not report the preliminary nature of the data and other limitations (Kuriya et al., 2008). Exaggerations in articles on pharmacologic treatments make readers more likely to believe that treatments are more beneficial than they really are (Boutron et al., 2019).

In addition to research on information about drugs in general, other studies have concentrated on information about specific medications or drug-related topics, such as antidepressants (Montagne, 2001), statins (Chisnell, 2017), hypnotics (Gabe et al., 2017), antibiotic resistance (Singh et al., 2016), medication for attention-deficit/hyperactivity disorder (Barry, 2012; Sherman, 2017), cannabis (Halvorson et al., 2018), "smart drugs" (Partridge et al., 2011), adherence to medication regimens (Goodfellow et al., 2013), or cancer drugs (Lewison et al., 2018; Fralick et al., 2013).

Studies on the Spanish press's reporting about drugs are scarce. A recent systematic review of the use of traditional media for informing the public about medicines (Catalán-Matamoros &

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<sup>1</sup> In this article the word "drug" is used to refer to medicines or medications rather than to psychoactive substances consumed for recreational purposes.

Peñafiel-Saiz, 2017) found no relevant studies on the Spanish press published between 2007 and 2016.

There are only two studies analyzing the quality of articles on drugs in the Spanish press, but they are a little outdated and limited in scope. The first (Carvajal et al., 1988) was a content analysis of 302 articles on drugs that were published in five prominent newspapers (ABC, Diario 16, El País, Ya, and La Vanguardia) in 1984; the second analyzed 643 articles on drugs in the health supplements of El País and El Mundo in 2002 (Vallano et al., 2005). Although at that time, science journalism was in its infancy in Spain (Casino, 2003), the authors of both studies concluded that the level of veracity was adequate and the quality acceptable.

Apart from these few general studies of reporting on drugs, various studies have focused on reports about specific drugs or therapeutic groups in the Spanish press. These include studies about contraceptives (Lete et al., 2006), cannabinoids or cannabis (Montané et al., 2005; Santos Diez & Camacho Markina, 2017), and anabolic steroids (Agulló et al., 2014). There are also analyses of reporting on vaccines, including vaccines in general (Catalan-Matamoros & Peñafiel-Saiz, 2019a; Catalan-Matamoros & Peñafiel-Saiz, 2019b) and particular vaccines, such as the smallpox vaccine (Martínez et al., 2015).

## 1.2. QUANTITATIVE STUDIES

Most studies on drugs in the press are content analyses and, in a smaller proportion, surveys. Many qualitative studies have analyzed the quality and other aspects of drug articles in the press. Although incomplete and fragmented, some problems, characteristics and deficiencies are already apparent. However, there are few bibliometric and quantitative analyses (Revuelta, 2012; Zhao et al., 2014), and these studies are necessary to frame the research, to know some relevant data on such a complex topic, and to guide future research.

Health and medical news represent 3.6% of the total news pieces in the US media (newspapers, television, radio and internet), and 5.9% in newspapers alone (The Kaiser Family Foundation & Pew Research Center, 2008). The only longitudinal study on articles about health and medicine in the Spanish press (the Quiral Project) showed that one of the most common topics was drugs (Revuelta, 2006; Revuelta & Minelli de Oliveira, 2008; Revuelta, 2012). This study was completed in 2009, and there are no data since; moreover, due to its methodological limitations, it does not allow us to know the real proportion of articles on drugs in the press or to answer other related questions. Thus, the quantity and proportion of newspapers articles that deal with drugs or drug-related topics have received the most coverage are unknown (Bosch et al., 2018).

Some of the questions that are worth answering with quantitative studies are: What proportion of articles on health and science concern drugs? What proportion of total newspaper articles concern drugs? Is this rate of information comparable to, for example, the one on education or the environment? What are the drug-related topics that receive the most coverage in the press? Are these coverages aligned with the interests of citizens? To what extent do journalistic articles on drugs focus on medical and economic issues? What volume of information on drugs is there in the business press as compared to the general press? Is cancer the subject that receives the most informative attention when talking about drugs as it does when talking about health in general?



What volume of journalistic information focuses on clinical research and the different phases of clinical trials? How many articles on drugs focus on vaccines? How has this information evolved?

These quantitative data are relevant to investigating how drug information has changed with the covid-19 epidemic or the silent dementia epidemic. Furthermore, quantitative analyses are also relevant to provide background data to pose new questions and guide research on drug information in the media.

Therefore, more quantitative –and also qualitative– studies are needed to ascertain the real situation of drug information in the Spanish press. Such studies would enable measures to be proposed to improve information on drugs in the press (Bosch et al., 2018). Together with strategies to better train journalists, these measures could help ensure that the general population receives truthful and critical information on medicines. In addition, improving scientific information could strengthen ties between scientists and society (Hunter, 2016).

### 1.3. OBJECTIVES

The present study was designed to analyze the information about drugs reported in the Spanish press and how it has evolved, comparing the data from different types of newspapers. There are three specific objectives:

1) To know how the volume of articles on drugs in the Spanish press has evolved over a decade, since just before the press crisis at the end of the 2000s. There are some indirect data about the previous decade, in which health information was stabilized after years of increase, but this work aims to analyse extensively the general information press and to compare it with the business and professional (medical) press. Despite the crisis in the press, it is to be expected that the volume of information on drugs, given its health and economic relevance, has remained more or less stable, especially in the business press.

2) To know the percentage of articles on drugs of a) the total articles on health and biomedicine; b) the total articles on science (including biomedicine), and c) the total articles in different types of press. There are some data about the coverage of different topics in the media, but not on drug coverage. Knowing the drug coverage will allow to compare it with those of other important subjects, such as education or the environment.

3) To know which drug-related topics receive the most media coverage in different types of press (general, business and professional). In a previous exploratory study (Casino, Serés & Bosch, 2018), the most relevant drug-related topics were identified; now we want to know what volume of information on ten relevant topics is published in the different types of press. It is relevant to know, for example, which type of press is most interested in issues such as clinical research and vaccines, among other relevant issues for health and economics. These data will allow more informed studies about the popularization of phases of a clinical trial in the press and how this information has changed with the covid-19 pandemic.

## 2. DESIGN AND METHOD

This study aims to quantitatively analyze newspaper articles on drugs and related topics published in the Spanish press to compare the data from different types of newspapers. Publications in a selection of general, business, and professional newspapers in a ten-year period (2008-2017) were analyzed to determine how reporting has changed over time. Choosing this period was based on three criteria: 1) it being a long period (at least a decade); 2) continuing the only comparable study, which quantitatively analyzed health in the Spanish press in the 2000s (Revuelta, 2012), and 3) being as current as possible (the study was carried out in 2018 and concluded in mid-2019). The study analyzed the overall number of articles on drugs and some specific related topics, as detailed below.

Based on previous bibliometric studies of newspapers' coverage of biomedical research (Pallari et al., 2017; Dumas-Mallet et al., 2019), the current study used a quantitative content analysis of the full texts of selected newspaper articles identified through selective searches in the Factiva Dow Jones database. The unit of analysis and counting was the individual newspaper article.

Depending on each research objective, different media and periods were selected, as detailed below.

### 2.1. EVOLUTION OF NEWSPAPER ARTICLES ON DRUGS

To quantitatively analyze the evolution of articles on drugs in the Spanish press (first objective), a 10-year study period (2008-17) was considered.

Newspapers were selected according to three criteria: 1) being available in Factiva during the study period; 2) having the highest circulation, according to the Office of Justification of Circulation [Oficina de Justificación de la Difusión], and 3) being published in Spanish. In the general press, all newspapers available in Factiva were selected among the 30 with the largest circulation in Spain (13 in total); in the general and professional press, two and one were selected, respectively, as they were the only ones that met the three criteria. The newspapers selected were the following:

- General information (n=13): El País, El Mundo, ABC, La Vanguardia, El Correo, El Diario Vasco, El Diario Montañés, Ideal, Sur, Las Provincias, El Comercio, La Verdad, and Diario de León;
- Business (n=2): Expansión and Cinco Días;
- Professional medical (n=1): Diario Médico.

Only the printed editions were included in the analysis; digital editions were not included because they were not available in Factiva during the whole period.

In addition, articles from the science news agency SINC during the same period were analyzed through its website.



## 2.2. PERCENTAGE OF NEWSPAPER ARTICLES THAT DEAL WITH DRUGS

It is impossible to determine the total number of news and opinion articles issued by newspapers from the information available on their websites. Moreover, obtaining this information from press databases such as Factiva is complicated and time consuming because Factiva shows search results in groups of 100 items and each search can yield no more than several thousand results; thus, to obtain the total number of articles published in a single year, many correlative searches must be carried out for periods of a few days.

To estimate the percentage of published articles that dealt with drugs (second objective), 10 newspapers were analyzed in Factiva during a single year (2017, the last one available while the study was conducted): 6 general newspapers (El País, La Vanguardia, El Mundo, El Diario Montañés, Sur, and Eldiario.es), two business newspapers (Expansión and Cinco Días), and two professional newspapers (Diario Médico and Correo Farmacéutico)<sup>2</sup>. Of the 13 general newspapers analyzed for objective 1, the three with the highest circulation (El País, La Vanguardia, El Mundo), plus the first of 11-20 on the 2017 circulation ranking (El Diario Montañés) and the first of 21-30 on the circulation list (Sur) were selected for this second objective. In addition, the digital newspaper with the highest audience (eldiario.es) was selected to complete the sample.

Articles issued in 2017 by the science news agency SINC were also analyzed. Articles on drugs from this source are easier to count because this outlet publishes far fewer articles than general newspapers do, and it labeled all drug-related news pieces during the study period. In addition, the SINC agency was used to calculate the percentage of articles about drugs of the total about biomedicine and of the total about science.

## 2.3. ANALYSIS OF DRUG-RELATED TOPICS

Based on a previous exploratory analysis in Factiva of the most common drug-related topics in the Spanish press (Casino, Serés & Bosch, 2018), the following ten thematic categories were defined: preclinical research, clinical trials, adverse effects, cancer, infections, antibiotics, drug resistance, generics and biosimilars, vaccines, and scientific journals. The overlapping analysis was not performed.

The quantitative analysis of news articles about these ten drug-related topics (third objective) was carried out in the same ten newspapers used for the second objective and also focused only on 2017.

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<sup>2</sup> The professional medical newspaper Correo Farmacéutico was not included for the first objective because it was not available in Factiva during the 10 years analyzed (2008-2017).

### 3. FIELDWORK AND DATA ANALYSIS

Factiva searches and data collection took place during December 2018 and January 2019.

#### 3.1. FACTIVA SEARCH FILTERS AND PHRASES

The filters used for searches were:

- Default exclusion filters activated in the Factiva configuration.
- Filter for the location and elimination of duplicates: "identical".
- Filter for sorting results: "oldest first".

The search terms to retrieve articles about drugs were: "(farmaco\* or medicamento\*) AND la=es and sc=\*\*" (where \*\* is the Factiva code of each publication).

The search terms for the ten topic categories were as follows:

- Pre-clinical research: "((farmaco\* or medicamento\*) and (preclinic\* or investigacion\* basica\*))"
- Clinical trials: "((farmaco\* or medicamento\*) and (ensayo\* clinico\* or estudio\* clinico\* or investigacion\* clinica\*))"
- Adverse effects: "((farmaco\* or medicamento\*) and (efecto\* advers\* or reaccion\* advers\* or evento\* advers\* or efecto\* indesead\* or reaccion\* indesead\* or evento\* indesead\* or efecto\* secundari\* or reaccion\* secundari\* or evento\* secundari\* or farmacovigilancia))"
- Cancer: "((farmaco\* or medicamento\*) and cancer\*)"
- Infections: "((farmaco\* or medicamento\*) and (infeccio\*))"
- Antibiotics: "((farmaco\* or medicamento\*) and antibiot\*)"
- Drug resistance: "((farmaco\* or medicamento\*) and resisten\*)"
- Generics and biosimilars: "((farmaco\* or medicamento\*) and (generico\* or biosimilar\*))"
- Vaccines: "((farmaco\* or medicamento\*) and (vacuna\* or inmunoterapia\*))"
- Scientific journals: "((farmaco\* or medicamento\*) and (Journal or NEJM or New England or BMJ or British Medical Journal or Lancet or Annals of Internal Medicine or JAMA or PLOS or Science or Nature or PNAS or Scientific Reports))"

To identify newspaper articles about drugs, the authors assumed that the terms "farmaco\*" or "medicamento\*" must appear in the headline or the first two paragraphs. This assumption was based on the analysis and one-to-one checking of a small sample of text using this search strategy.

To identify the articles, the Factiva field tag "HLP" was used; this label delimits the search to include only the headline and the first two paragraphs (lead). To narrow the search to the headlines, the field tag "HD" also was used.

#### 3.2. DATA ANALYSIS



All searches and corresponding data records were conducted at three levels, aiming to successively identify the terms in the full text, the headline or the first two paragraphs, and the headline only.

For all searches, gross and net (without duplicates) data were recorded in a spreadsheet. The subsequent data analysis focused mainly on the net data from the headline and lead searches (using the field label "HLP"), as this was considered the best estimate of the actual number of articles on drugs (in the Results section, where not otherwise indicated, the data refer to this level of analysis).

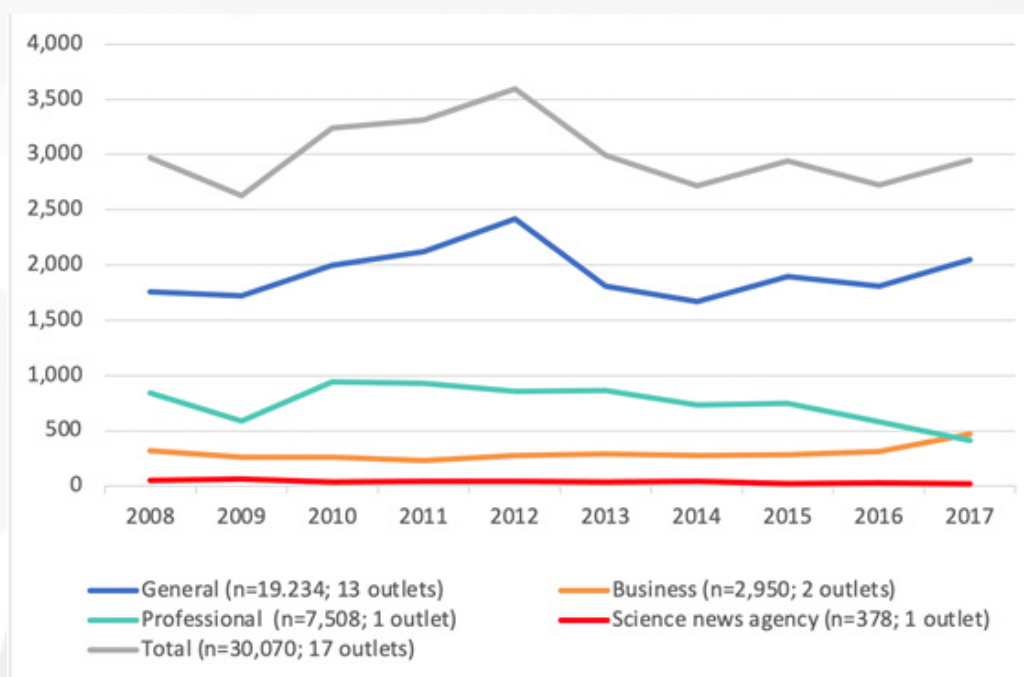
## 4. RESULTS

The results of the research are presented separately by objectives.

### 4.1. ARTICLES ABOUT DRUGS IN THE SPANISH PRESS

The annual volume of articles on drugs in the 16 newspapers and the science news agency SINC (n=30,070) remained relatively stable over the period comprising 2008 through 2017 (Table 1 and Figure 1). The volume of articles increased from 2008 to 2012 and then decreased through 2017, with the decline being more pronounced in the professional press and the science news agency.

Figure 1. Articles on drugs by type of press



Source: Own elaboration

**Table 1. Articles with information on drugs in the Spanish press (2008-2017)**

Press type	Information on drugs in: (1)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Entire period
<b>General</b>												
El País	Full text (2)	622	740	685	867	1,021	660	604	528	324	416	6,467
	Headline and lead (3)	240	260	295	343	427	244	226	225	102	190	2,552
	Headline (4)	51	44	71	83	113	45	53	46	13	44	563
El Mundo	Full text	284	382	372	318	348	254	288	331	262	321	3,160
	Headline and lead	40	88	77	73	88	39	58	82	48	125	718
	Headline	16	23	31	23	31	21	39	55	31	51	321
ABC	Full text	583	727	620	596	661	727	740	880	406	463	6,403
	Headline and lead	135	181	199	250	255	281	267	331	183	212	2,294
	Headline	65	48	50	53	68	60	58	104	63	74	643
La Vanguardia	Full text	354	433	373	412	451	424	357	446	400	470	4,120
	Headline and lead	103	97	172	189	189	203	155	205	181	240	1,734
	Headline	24	24	40	41	51	50	45	42	39	51	407
El Correo	Full text	225	308	510	328	495	192	376	571	380	414	3,799
	Headline and lead	80	128	211	143	224	82	157	259	171	176	1,631
	Headline	14	22	48	30	42	13	40	66	53	57	385
Diario Vasco	Full text	69	103	361	317	384	238	184	205	167	206	2,234
	Headline and lead	19	43	156	136	145	94	82	72	99	100	946
	Headline	5	4	30	39	30	27	15	14	32	28	224
El Diario Montañés	Full text	315	287	293	216	95	287	291	296	302	296	2,678
	Headline and lead	140	118	134	92	45	118	115	121	124	102	1,109
	Headline	38	20	30	24	10	20	29	28	41	43	283
Ideal	Full text	290	305	93	71	122	76	63	83	510	549	2,162
	Headline and lead	72	100	38	23	35	17	16	35	192	218	746
	Headline	16	21	11	1	7	5	7	12	70	86	236
Sur	Full text	457	425	311	334	241	159	109	184	316	401	2,937
	Headline and lead	202	190	141	136	120	63	44	81	140	168	1,285
	Headline	47	33	31	22	35	17	16	25	64	78	368
Las Provincias	Full text	770	258	198	490	478	272	208	167	257	289	3,387
	Headline and lead	248	87	65	187	205	136	99	91	129	133	1,380
	Headline	63	10	14	46	37	37	33	22	59	40	361
El Comercio	Full text	208	320	336	346	320	285	227	292	144	147	2,625
	Headline and lead	88	84	125	110	144	104	83	121	70	72	1,001
	Headline	23	17	28	24	22	26	25	31	24	31	251
La Verdad	Full text	594	627	499	734	772	550	423	433	536	376	5,544
	Headline and lead	244	241	187	308	369	231	194	201	240	168	2,383
	Headline	64	41	40	60	86	47	60	49	96	61	604
Diario de León	Full text	384	254	450	367	422	417	337	179	349	396	3,555
	Headline and lead	143	102	199	128	172	197	171	69	129	145	1,455
	Headline	54	33	81	50	50	67	72	21	30	33	491
<b>Business</b>												
Expansión	Full text	359	344	263	253	301	311	357	300	347	507	3,342
	Headline and lead	162	145	127	142	148	185	195	155	190	292	1,741
	Headline	54	40	25	34	27	35	33	30	45	65	388
Cinco Días	Full text	296	244	265	187	251	223	189	251	257	314	2,477
	Headline and lead	155	112	131	88	127	101	77	124	118	176	1,209
	Headline	47	34	43	20	40	25	18	24	31	51	333
<b>Professional</b>												
Diario Médico	Full text	1,781	1,277	2,093	2,040	1,920	1,743	1,502	1,643	1,402	1,238	16,639
	Headline and lead	844	588	944	926	858	866	736	750	581	415	7,508
	Headline	165	159	278	284	255	245	170	177	135	84	1,952
<b>Science news agency</b>												
SINC	Drug articles (5)	52	64	36	41	40	32	43	23	28	19	378

(1) Number of articles after removal of duplicates.  
(2) Number of articles mentioning drug in the full text.  
(3) Number of articles mentioning drug in the headline, section name or first two paragraphs (lead).  
(4) Number of articles mentioning drug in the headline.  
(5) Classified as pharmacology articles by the outlet.

**Source: Own elaboration**

The national press included on average the same number of articles about drugs than the business press. The average frequency of articles on drugs by type of press and its standard deviation is as follows:

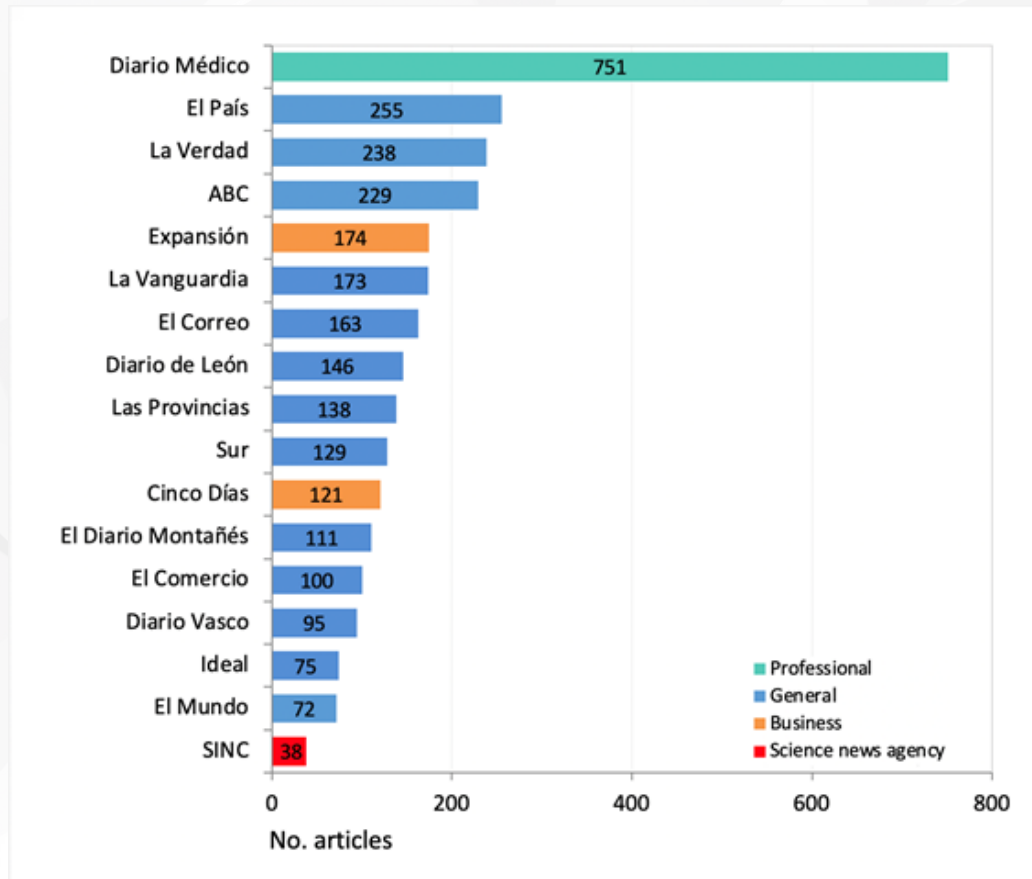
- General: 3 article every week (148 articles /year;  $\sigma = 59.06$ )
- Business: 3 articles every week (148 articles /year;  $\sigma = 26.60$ )
- Professional: 14 every week (751 articles /year)



- Science news agency: 1 every 10 days (38 articles /year)

Figure 2 shows the average number of articles on drugs published per year in each of the news outlets analyzed.

**Figure 2. Average number of articles on drugs per year by news outlet**



Source: Own elaboration

El País is the non-professional newspaper that published the most articles about drugs (255 articles/year), and El Mundo published the fewest (72 articles/year). Among the regional newspapers, La Verdad published the most articles per year on average (238).

As for the headlines on drugs in the general press (Table 1), ABC and El País published more than one weekly headline on average over the ten years analyzed. The regional newspapers published an average of one headline every ten days; only one (La Verdad) of the ten regional newspapers published over one headline about drugs per week.

The number of articles on drugs in the 16 newspapers ( $n=29,692$ ) accounted for 41.5% of all the articles that mentioned the search terms ("farmaco\*" or medicamento\*") in the full text ( $n=71,529$ ).

## 4.2. PERCENTAGE OF ALL ARTICLES PROVIDING INFORMATION ON DRUGS

Table 2 reports the absolute numbers and percentages of articles for the three levels of analysis (full text, headline and lead, and headline) published in the ten newspapers and the SINC agency in 2017. The average percentage of articles dealing with drugs in the different categories of newspapers was:

- General: 0.5%
- Business: 0.8%
- Science news agency: 1.2%
- Professional (specialized in medicine): 8.5%
- Professional (specialized in pharmacy): 39%

Figure 3 shows the percentage of articles that dealt with drugs in the newspapers belonging to each type of press.

**Table 2. Percentage of all articles in the Spanish press (2017) that provided information on drugs**

Press type	Total articles	Articles that provided information on drugs in: (1)					
		Full text (2)		Headline and lead (3)		Headline (4)	
	No.	No.	%	No.	%	No.	%
<b>General</b>							
El País	36,645	416	1.14%	190	0.52%	44	0.12%
El Mundo	29,554	321	1.09%	125	0.42%	51	0.17%
La Vanguardia	31,292	470	1.50%	240	0.77%	51	0.16%
Diario Montañés	33,880	296	0.87%	102	0.30%	43	0.13%
Sur	44,202	401	0.91%	168	0.38%	78	0.18%
Eldiario.es	3,353	53	1.58%	13	0.39%	5	0.15%
Total national press	178,926	1,957	1.18%	838	0.46%	272	0.15%
<b>Business</b>							
Expansión	35,112	507	1.44%	292	0.83%	65	0.19%
Cinco Días	20,688	314	1.52%	176	0.85%	51	0.25%
Total business press	55,800	821	1.48%	468	0.84%	116	0.22%
<b>Professional</b>							
Diario Médico	4,856	1,238	25.49%	415	8.55%	84	1.73%
Correo Farmacéutico	2,829	1,475	52.14%	1,104	39.02%	314	11.10%
Total professional press	7,685	2,713	38.82%	1,519	23.79%	398	6.41%

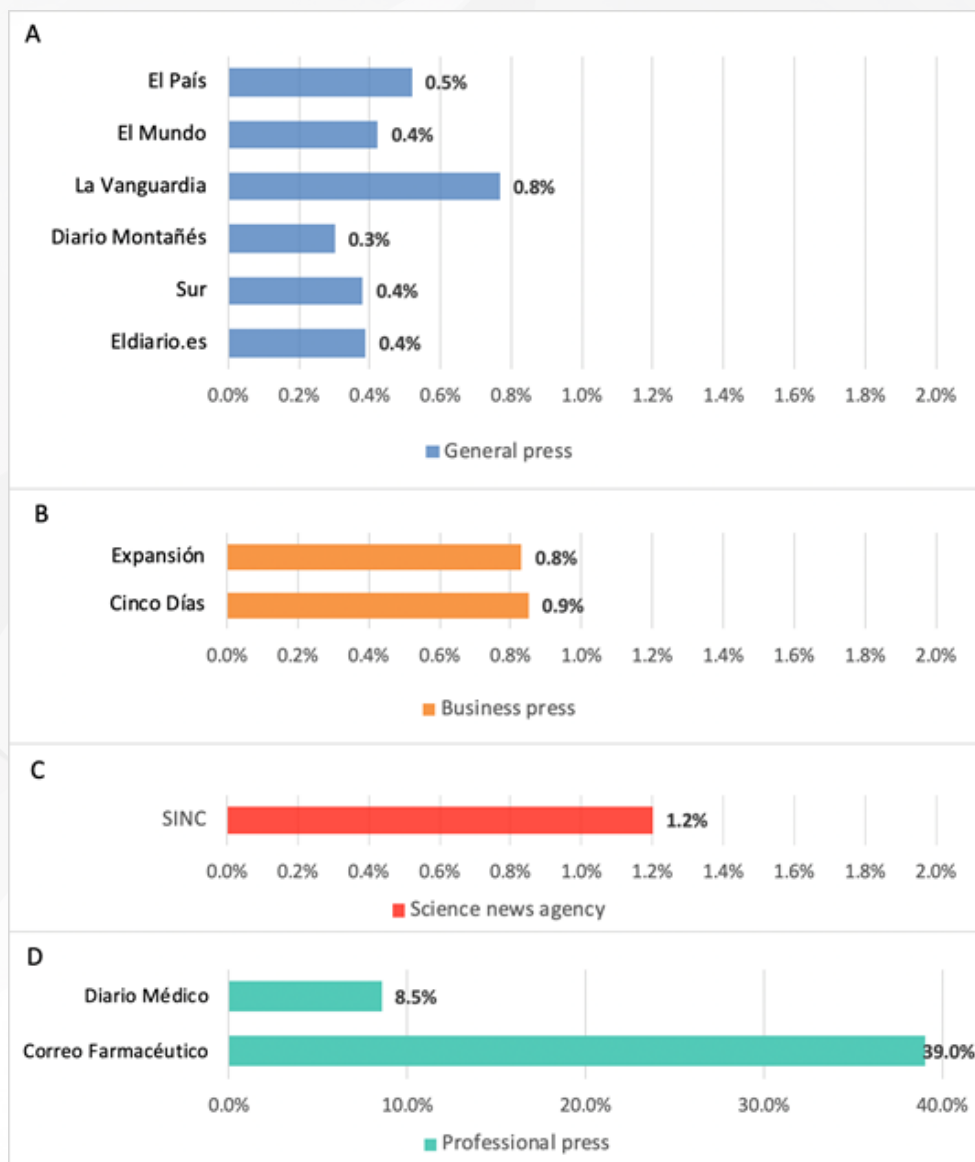
(1) Number of texts after removal of duplicates.  
(2) Number of texts mentioning drugs in the full text.  
(3) Number of texts mentioning drugs in the headline, section name or first two paragraphs (lead).  
(4) Number of texts mentioning drugs in the headline.

**Source: Own elaboration**

For the SINC agency, in the period 2008-2017, 6.1% (378/6448) of all biomedicine articles were about drugs, and 1.6% (378/23578) of all science articles were about drugs. Biomedicine articles represented 27.6% (6,448/23,578) of all articles on science published at SINC in these ten years.



**Figure 3. Percentage of articles on drugs of the total articles (2017)**



Source: Own elaboration

### 4.3. MOST FREQUENT DRUG-RELATED TOPICS

Table 3 shows absolute and relative numbers of articles on drugs and the other ten topics in 2017. Figure 4 compares the percentage of articles on these ten topics in the general, business, and professional press.

**Table 3. Percentage of texts with information on drugs and related topics in the Spanish press (2017)**

Press type	Information on	Full text (1)		Headline and lead (2)		Headline (3)	
General press	Drugs	1,845	100.0%	797	100.0%	249	100.0%
	Cancer	314	17.0%	91	11.4%	20	8.0%
	Vaccines	121	6.6%	34	4.3%	10	4.0%
	Drug resistance	101	5.5%	27	3.4%	5	2.0%
	Antibiotics	79	4.3%	23	2.9%	6	2.4%
	Clinical trials	132	7.2%	23	2.9%	2	0.8%
	Infections	131	7.1%	22	2.8%	1	0.4%
	Adverse effects	106	5.7%	19	2.4%	0	0.0%
	Scientific journals	92	5.0%	15	1.9%	0	0.0%
	Generics/biosimilars	57	3.1%	11	1.4%	0	0.0%
Preclinical research	18	1.0%	4	0.5%	0	0.0%	
Business press	Drugs	821	100.0%	468	100.0%	116	100.0%
	Cancer	118	14.4%	49	10.5%	3	2.6%
	Vaccines	63	7.7%	18	3.8%	0	0.0%
	Drug resistance	20	2.4%	5	1.1%	0	0.0%
	Antibiotics	21	2.6%	8	1.7%	0	0.0%
	Clinical trials	101	12.3%	26	5.6%	1	0.9%
	Infections	26	3.2%	5	1.1%	1	0.9%
	Adverse effects	14	1.7%	4	0.9%	0	0.0%
	Scientific journals	15	1.8%	5	1.1%	0	0.0%
	Generics/biosimilars	118	14.4%	46	9.8%	3	2.6%
Preclinical research	27	3.3%	10	2.1%	0	0.0%	
Professional press	Drugs	2,609	100.0%	1,515	100.0%	762	100.0%
	Cancer	476	18.2%	115	7.6%	12	1.6%
	Vaccines	293	11.2%	70	4.6%	9	1.2%
	Drug resistance	212	8.1%	47	3.1%	7	0.9%
	Antibiotics	146	5.6%	36	2.4%	1	0.1%
	Clinical trials	388	14.9%	70	4.6%	5	0.7%
	Infections	298	11.4%	39	2.6%	1	0.1%
	Adverse effects	309	11.8%	64	4.2%	9	1.2%
	Scientific journals	347	13.3%	89	5.9%	6	0.8%
	Generics/biosimilars	199	7.6%	95	6.3%	16	2.1%
Preclinical research	95	3.6%	14	0.9%	2	0.3%	

(1) Number of texts mentioning drugs and related topics in the full text.  
(2) Number of texts mentioning drugs and related topics in the headline, section name or first two paragraphs (lead).  
(3) Number of texts mentioning drugs and related topics in the headline.

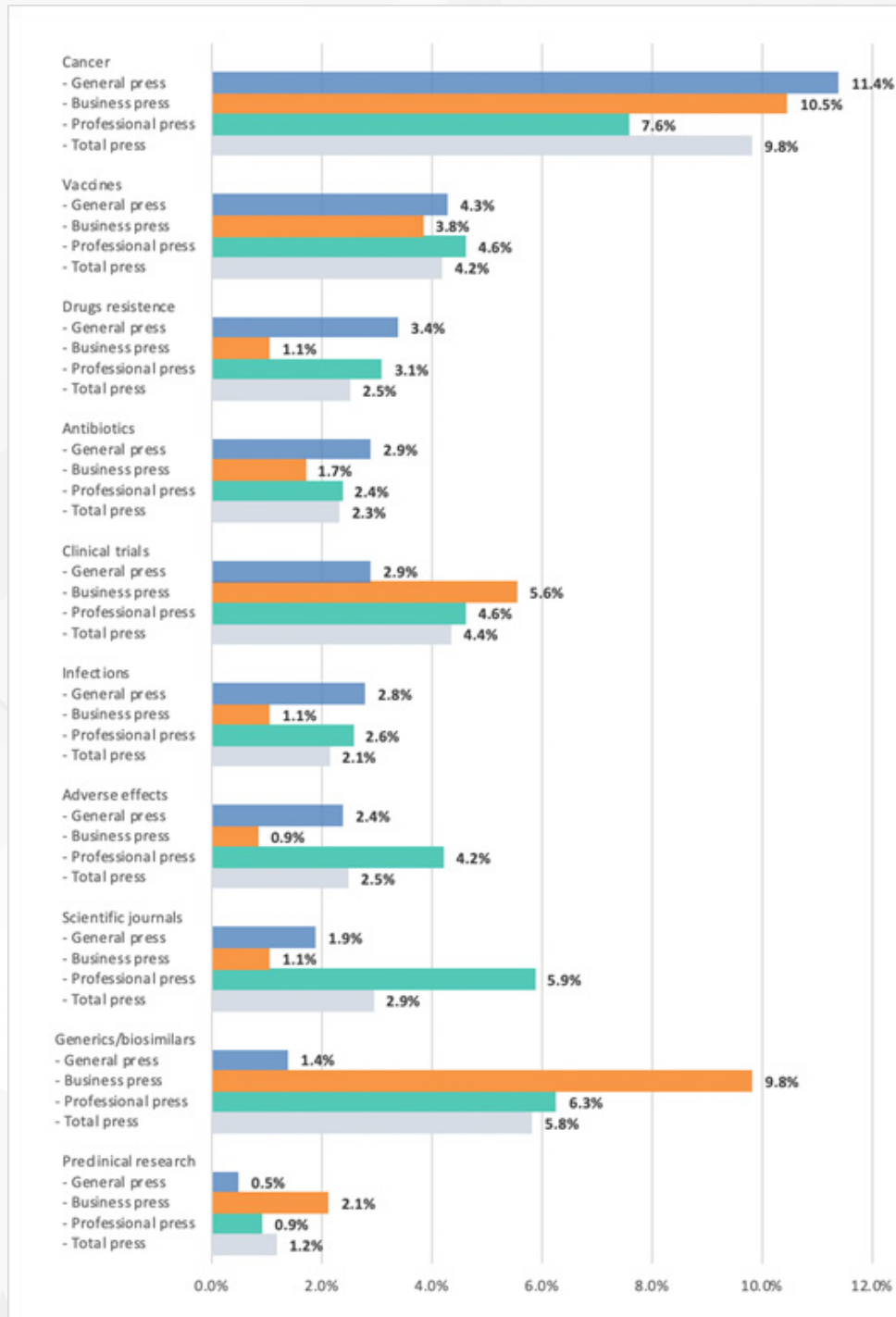
**Source: Own elaboration**

In articles about drugs, cancer was the most common topic in all types of press; 11.4% of articles about drugs published in the general newspapers and 10.5% in the business press referred to cancer. One of every 12 headlines in the general newspapers' articles about drugs included the word "cancer".

Overall, preclinical research was the thematic area that received the least attention in the press (1.2% of articles about drugs); clinical research (clinical trials) was nearly four times as common, accounting for 4.4% of all articles on drugs.



**Figure 4. Percentage of articles on drug-related topics**



**Topics are ordered from highest to lowest frequency in the general press.**

**Source: Own elaboration**

Articles on generics and biosimilars were prominent in the business press; 9.8% of articles in the business press and 6.3% in the professional press informed about generics and biosimilars, and 1 in 25 headlines in the professional newspapers included the words "generic" or "biosimilar". In the general press, 1 in 25 headlines about drugs referred to vaccines and the word "antibiotic" was present in 1 in 40 headlines.

Scientific journals were mentioned in 5.9% of the articles on drugs published in the professional press, but in only 1.9% of those published in the general press and 1.1% of those published in the business press (1.1%).

#### 4.4. MOST SIGNIFICANT RESULTS

This most significant results of this quantitative analysis are:

- On average, general newspapers published one article on drugs every two days; regional newspapers published one every three days; business newspapers published three every week; and professional newspapers published two every day.
- The volume of articles on drugs in the Spanish press remained relatively stable throughout the ten-year period, although it fell slightly in the second half.
- Articles on drugs accounted for 0.5% of all articles published in the general press, 0.9% of those published in the business press, 1.2% of those published by the science news agency, and 8.5% of those published in the newspaper for medical professionals.
- Cancer was the most common topic in drug articles in all the types of newspapers analyzed. In general newspapers, 11.4% of texts on drugs dealt with about cancer and the word "cancer" was included in 1 of every 12 headlines for articles about drugs.

## 5. DISCUSSION AND CONCLUSIONS

This study quantitatively analyzed the articles on drugs published in the period comprising 2008 through 2017 by different news outlets in Spain, including general newspapers, business newspapers, and professional newspapers, as well as by the leading Spanish science news agency. To the authors' knowledge, this is the first study to employ a comprehensive quantitative content analysis to explore how newspapers in Spain have dealt with information on drugs in recent years.

The use of newspapers for communicating information about drugs to the public has become apparent during recent years mainly in high-income countries such as the US, the UK, Australia, Canada, and Italy (Catalan-Matamoros & Peñafiel-Saiz, 2017). While most studies have used cross-sectional approaches to examine newspaper coverage of drugs, the present study examined articles on drugs in the leading general, business, and professional Spanish newspapers over a ten-year period.

This analysis shows that the overall volume of articles on drugs remained relatively stable during the ten-year period, although the volume decreased by 10% and this decrease was especially pronounced in the last half of the period (2012-2017). This decrease might be partly due to limiting the analysis to print editions. In the 2010s, the number of pages included in print editions generally declined, so the number of articles also decreased. These findings are in partial agreement with those of González-García et al. (2020), who reported that the number of newspaper articles on drugs (most from El País) changed little over the period comprising 2001 through 2016 but declined between 2010 and 2015.

The results of the present study show that articles on drugs have a notable and regular presence in all types of press. The general and business newspapers published about three articles on drugs every week, a rate predictably much lower than the professional medical press. The news agency, although specialized in science, only published about one article on drugs every 10 days, but this can be explained by its lower total volume of articles published. The regular presence of articles on drugs across all types of newspapers confirms that pharmaceuticals are considered a relevant issue for general, business, and scientific publics.

Interestingly, the proportion of articles that deal with drugs varied considerably among different types of newspapers. In relative terms, compared to the general press, business newspapers published nearly twice as many articles on drugs and the science news agency published three times as many. These data indicate that drug-related issues are prominent in the sphere of business and even more so in the sphere of science. The digital newspaper analyzed (eldiario.es) published far fewer articles about drugs, but the total number of articles was only about a tenth of the total number published in traditional newspapers, so the percentage of drug-related articles was similar.

Of all articles on biomedicine published by the science news agency (SINC) 6.1% dealt with drugs, as did 8.5% of all articles in the professional medical newspaper (Diario Médico). In a content analysis of five general newspapers, Revuelta (2012) estimated that 3.5% of the health-related articles dealt with drugs and the pharmaceutical industry. Although this percentage is lower than in the current study, it is not inconsistent with the data reported here, because part of the drug share in Revuelta's studio may have been classified in other categories, such as cancer, research, or infectious diseases.

In all three types of newspapers, the topic that was most common in articles about drugs was cancer; in the general press, the second was vaccines. These findings are consistent with those of Carvajal's study (1988), in which vaccines and cytostatics were the drugs most frequently dealt with in the general press. It would seem that news interests in drugs have changed little. Cancer was also the drug-related topic that figured most frequently in headlines. The prevalence of cancer is increasing worldwide and so is the prevalence of myths and misconceptions regarding its prevention or treatment that interfere with risk perceptions (Powe et al., 2005; Saeed et al., 2019). These trends might explain why articles about cancer are common in newspapers, and why treatment and social issues are the topics mentioned most often in these articles (Miyawaki et al., 2016). Newspapers have an impact on the public's perceptions and use of cancer drugs; and journalists' beliefs about cancer can be translated to the general public (Domínguez & Sapiña, 2019).

Generic and biosimilar medicines have a prominent presence in the business press, and to a lesser extent in the professional press, reflecting the importance of these products for business and professional readers. However, their presence in the general press is scant; thus, the general public may develop a specific deficit of information about these medicines. This could be an interesting hypothesis to explore in future studies.

In the present study, clinical research (clinical trials) on drugs had a more significant presence than preclinical research in all three types of newspapers analyzed. These findings differ from those of other studies analyzing the coverage of medical research in a mix of general and



business newspapers (Bartlett et al., 2002; Yeu Lai & Lane, 2009). These differences might be explained by the influence of pharmaceutical companies' press releases in journalists' preference to cover clinical trials, which are over-represented in press releases (Bartlett et al., 2002). By contrast, when compared to medical journals, randomized controlled trials tend to be under-represented in newspapers (Selvaraj et al., 2014). In relative terms, the business press devoted nearly twice as many articles to clinical trials as the general press, reflecting the economic significance of the successive phases of clinical trials. The information on these phases in the general and business press has not been investigated, although one would expect it to be more relevant in the business press. Outside the period analyzed in the current study, the development of vaccines against COVID-19 has likely led to more information about the phases of clinical trials in all news media, but these perceptions would need to be investigated.

The current analysis also found that adverse effects of drugs were mentioned in only 2.4% of the articles in the general newspapers compared to 4.2% in the professional newspapers. Various studies have also reported that newspaper articles about drugs rarely deal with adverse effects (Moynihan et al., 2000; Schwitzer, 2008), and this topic deserves to be studied in detail in future research.

One of the main contributions of the present study is that it provides numerical estimates based on diverse publications to contextualize the information about drugs that is published in general, business, and professional newspapers in Spain. However, some limitations of this study must be mentioned. Although the study analyzed 17 newspapers and a science news agency with large circulations, these publications are not necessarily representative of the Spanish press, nor do they represent the entire media universe. Furthermore, only the printed editions of some newspapers were analyzed (SINC and eldiario.es have only a digital edition and other newspapers have the same content in their print and digital editions). However, the findings in the data from the digital newspaper analyzed were similar.

Moreover, although estimating the number of articles on a topic based on our search strategy enabled large volumes of text to be analyzed (El País issues about a hundred articles a day, some 36,500 articles a year), this method has various limitations. Among others, the search may have missed some articles about specific drugs or therapeutic groups. To estimate the number of articles on drugs, this study assumed that the keywords used in searches would be present in the headline and the first two paragraphs. This criterion was adopted after previous validation in small samples. The number of articles on drugs in the newspapers analyzed represents 41.5% of all articles that mention the search terms in the full text. Therefore, further studies are necessary to confirm whether this search strategy in the headline and the first two paragraphs is valid.

To conclude, this research provides a strategy for the content analysis of large volumes of information as well as relevant estimates to guide future research on information about drugs in the media.

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