Vol. 12, No. 2 (2026), pp.82–91

CHITKARA UNIVERSITY

Journal of Multidisciplinary Research in Healthcare



Newspapers as a Tool of Health Communication and Dissemination in Relation to Stroke: A Trend Analysis

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RESEARCH ARTICLE **Open Access**

ARTICLE INFORMATION

Received: June 11,2026
Accepted: October 13, 2026
Published Online:November 13, 2026

Keywords:
Stroke, Newspaper, Health communication, Dissemination, Prevention, Strategies

DOI: 10.15415/jmrh.2026.122008

ABSTRACT

Background: The role of newspapers is crucial due to their widespread availability. It comprises a comprehensive genre and may serve as a foundational mass medium for public health communication by educating a large population and helping in shaping social norms and influencing health literacy.

Purpose: The current study represents a trend analysis of ten National Indian newspaper analyses (duration 2012-2024) in relation to "stroke." The study provides an in-depth understanding of the focus and trends of information regarding stroke to identify the gap in areas of communication.

Methods: A comprehensive analysis of news articles published (from 2012 to 2024) on the stroke in India's leading Hindi (n=5) and English newspapers (n=5) was done. News articles on stroke were screened following inclusion/exclusion criteria under defined thematic categories. Statistical analysis was performed using GraphPad Prism and Jamovi software.

Results: The newspaper analysis in relation to stroke indicated that awareness-related information on stroke dominated over the past years and continued over a selected period as compared with other thematic areas like risk factors, prevention, treatment, government policy, research studies, death reports, and case studies. Growing attention in the media to the topic of stroke, especially in the last five years was observed. English newspapers exhibited more coverage about government policies, while Hindi newspapers focused on basic awareness and risk factors.

Conclusion: Newspapers as a health communication tool have huge potential, and their utilization must be aligned with population-wide strategies for maximum outreach..

1. Introduction

Stroke is a global health burden, affecting more than 12 million individuals each year, all over the world (Vos *et al.,* 2020). According to the American Heart Association (AHA), stroke is considered an alarming health issue due to its high mortality rate (Benjamin *et al.,* 2018). However, the ischemic stroke is predominant and responsible for the blood clot in the blood vessel or forms a structural malformation of the blood vessel in the brain (Hurford *et al.,* 2020), and the hemorrhagic stroke is responsible for damaging blood vessels (Gil-Garcia *et al.,* 2022). Both types of strokes can cause local hypoxia and reduction of the supply of oxygen and other nutrients, with consequent damage or death of neurons (Gil-Garcia *et al.,* 2022; Hurford *et al.,* 2020). However, knowledge of the instantaneous required action that is necessary to manage a stroke patient can reduce both mortality and morbidity among them by quick reach in hospitals, which can save lives (Wechsler *et al.,* 2023).

However, the magnitude of stroke burden continues to grow. As reported earlier, stroke is considered the fourth highest cause of death and the fifth highest cause of disability in India (Jones *et al.,* 2022). The rate of incidence of stroke is continuously increasing in India; from 1990 to 2021, it went from 76 per 100,000 population to 88 per 100,000 population. Similar trends were also observed in the death rate (44 per 100,000 population to 55 per 100,000 population) (Behera *et al.,* 2024). This burden arises due to multiple risk factors, including hypertension, diabetes, tobacco use, dyslipidemia, and lifestyle changes linked with

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changing socioeconomic status and urbanization in the country (Das & Banerjee, 2008).

Precise understanding of stroke risk factors, warning signs, the right attitude, and proper practices of prevention are shown to reduce the serious impact of stroke (Hankey *et al.,* 2005). The role of health communication is very important for the prevention of disease and health promotion (Ishikawa & Kiuchi, 2010). While health literacy focuses on an individual having the capacity to gain knowledge of health that helps them in decision-making and health promotion and increases disease-preventive behavior (Ishikawa & Kiuchi, 2010). The importance of mass media as the primary source of information regarding strokes and their risk factors for the general public is emphasized by past reports that suggest the need for healthcare professionals and stroke advocacy organizations to promote increased media attention on stroke (Bartley *et al.*, 2009). In addition, the role of newspapers is widely criticized for spreading knowledge about health in society (Kanchan & Gaidhane, 2024; Menon *et al.,* 2020; Verma *et al.,* 2024; Ouchene *et al.,* 2024; Paramasivam *et al.,* 2025; Paul & Singh, 2016; Venkat & Janakiram, 2021; Verma *et al.,* 2025).

The role of health communication is very important for the prevention of disease and health promotion. The present study undertakes the key research question of studying the role and importance of newspapers in disseminating information about stroke in the community and their potential contribution to effective stroke prevention.

2. Methodology

2.1. Study Design and Data Sources

A quantitative and qualitative content analysis was conducted to examine newspaper coverage of stroke. Articles were retrieved from 10 major high-circulation national daily newspapers spanning January 2012 to December 2024. This included five English newspapers (The Hindu, Times of India, Hindustan Times, Indian Express, and The New Indian Express) and five Hindi newspapers (Amar Ujala, Dainik Jagran, Dainik Bhaskar, Hindustan, and Navbharat Times). Media archives were accessed via search engines (Google, Bing) as well as official newspaper websites.

2.2. Search Strategy

The search query was structured to capture articles addressing cerebrovascular events and related cardiovascular terminology. The search query included "stroke" OR "cerebrovascular accident" OR "brain attack" OR "transient ischemic attack" OR "heart." The search term "heart" was deliberately included to account for media articles that discuss stroke within the broader continuum of cardiovascular and cardiometabolic diseases, ensuring the full coverage.

2.3. Inclusion and Exclusion Criteria

News articles, editorials, features, or opinions with substantial information on stroke are included in the study. Selected articles were into eight thematic areas, i.e., 'Case report,' 'Death report,' 'Prevention,' 'Risk Factor,' 'Awareness,' 'Treatment,' 'Study Research & Publications reports,' and 'Government scheme and policy' as per their content. Articles having no information about clinical stroke, for instance, where the word "stroke" is used in a metaphorical sense, like gold strokes, were excluded. Articles regarding heat stroke were also excluded. Duplicate articles were counted as one entity. Letter to editors, short videos, or noneditorial commercial advertisements were also excluded.

2.4. Screening and Data Extraction

The screening of all news articles was conducted separately by two authors; any conflicts were resolved by the third author. The level of inter-rater reliability for screening between two authors was 0.85 (Cohen's kappa), indicating substantial agreement. A standardized, pilot-tested coding sheet was used for data extraction, which included news*p*aper source, publishing year, language, type of article, title, author, thematic area, etc. The complete strategy and process of the article selection and screening process is represented in Figure 1.

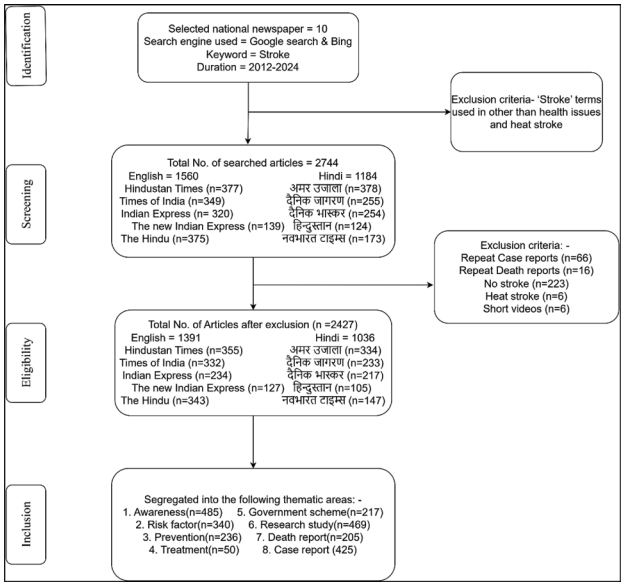


Figure 1: Strategy and Process of Articles Selection and Screening

2.5. Statistical Analysis

Categorical variables were presented as frequencies and percentages. Graphs were made using GraphPad Prism software (version 11.0.0). Inferential analyses were

performed using Jamovi software, version 2.7 (The Jamovi Project 2025). The chi-square test was used to assess the association, and Cramer's V test was used to measure the strength of association. Standardized residuals were also calculated to identify individual cell contribution. A two-sided $p < 0.05$ was considered statistically significant for all analyses.

3. Results

During the period of 2012 and 2024, we collected 2744 news articles related to stroke using Google, Bing, and newspaper websites for the analysis of news on stroke. There were 1560 articles in English and 1184 articles in the Hindi language; after applying exclusion criteria, 2427 news articles were considered for further analysis—categorized into eight thematic areas.

3.1. Year-Wise Trend

There is a general upward trend in the number of articles published about stroke across all newspapers over the years, with "The Times of India" peaking near 100 articles and "Hindustan Times" showing notable peaks in 2018 and 2021 (Figure 2). Others also showed substantial increases in publication numbers, particularly after 2017. Publications like The Hindu and The New Indian Express maintained a steady, albeit lower, output, without much fluctuation. The maximum hike was observed in categories such as awareness, prevention, research study, and risk factors (Figure 3). Overall, the data suggests growing attention in the media to the topic of stroke, especially in the last five years.

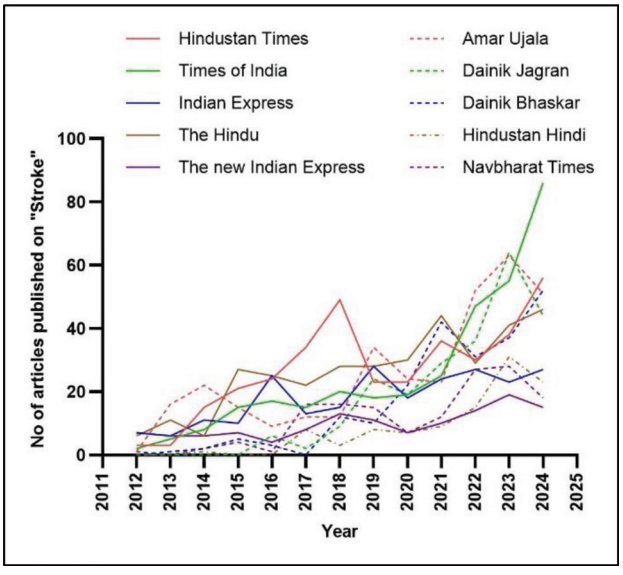


Figure 2: Year-wise Trend of Articles in Different Newspapers

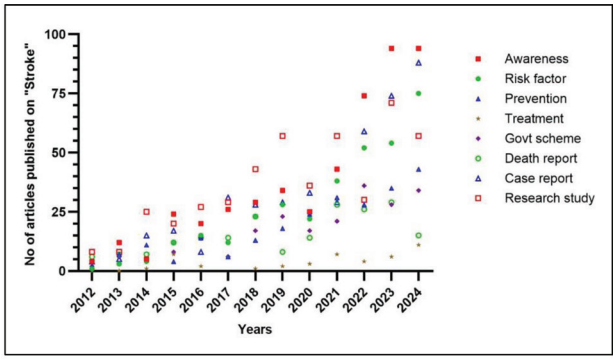


Figure 3: Year-wise Trend of Articles in Different Thematic Area

3.2. Category-Wise Trend

Across all the 2427 articles, awareness (n=485 articles, 20%), research studies (n=469, 19.3%), case reports (n=425, 17.5%), and risk factors (n=340, 14.01%) dominate the coverage, while government schemes/policies (9%), prevention (9%), and treatment (2%) related information received much less attention (Table 1). The Awareness category has the highest number of articles overall, with The Hindu and The Times of India followed by Amar Ujala and Dainik Jagran. Risk factors and prevention showed strong media interest, particularly from Amar Ujala, Danik Bhaskar, Danik Jagran, Hindustan Times, and Times of India (Figure 4). However, articles related to research studies are more prevalent in English newspapers as compared to Hindi newspapers. The death report articles were less reported, that too of majorly eminent personalities. Thus, news articles were not equally addressing all the clinical and public health issues.

Table 1: Thematic Area Wise Distribution of Newspaper Articles

Category	Count	Percentage (%)
Awareness	485	19.98
Research Study	469	19.32
Case Report	425	17.51
Risk Factor	340	14.01
Prevention	236	9.72
Government Scheme/Policy	217	8.94
Death Report	205	8.45
Treatment	50	2.06
χ^2 ==535, df=7, p <.001		

Table 2: Language-Wise Distribution of Newspaper Articles

	Frequency and Percentage	Awareness	Risk Factor	Prevention	Treatment	Government Scheme/ Policy	Research Study	Death Report	Case Report	Total
English	Observed	236	111	87	22	155	331	160	289	1391
	Expected	278	195	135	28.7	124.4	269	117.5	244	1391
	% Within Row (English)	17.00%	8.00%	6.30%	1.60%	11.10%	23.80%	11.50%	20.80%	100.00%
	% Within Column (Category)	48.70%	32.60%	36.90%	44.00%	71.40%	70.60%	78.00%	68.00%	57.30%
Hindi	Observed	249	229	149	28	62	138	45	136	1036
	Expected	207	145	101	21.3	92.6	200	87.5	181	1036
	% Within Row (Hindi	24.00%	22.10%	14.40%	2.70%	6.00%	13.30%	4.30%	13.10%	100.00%
	% Within Column (Category)	51.30%	67.40%	63.10%	56.00%	28.60%	29.40%	22.00%	32.00%	42.70%
Total	Observed	485	340	236	50	217	469	205	425	2427
χ^2 value (251), **df=7, p <.001, likelihood ratio= 255, Cramer's V= 0.321**										
Post Hoc Test (Standardized residuals)										
Language	**Awareness**	**Risk Factor**	**Prevention**	**Treatment**	**Government Scheme/Policy**	**Research Study**	**Death Report**	**Case Report**		
English	-4.31	-9.92	-6.68	-1.92	4.41	6.46	6.27	4.9		
Hindi	4.31	9.92	6.68	1.92	-4.41	-6.46	-6.27	-4.9		
Standardized Residual Analysis (Z > 1.96) indicates statistical significance at p < 0.05). Z > 1.96 Significantly *more* cases than expected. Z < 1.96 Significantly *less* cases than expected.										

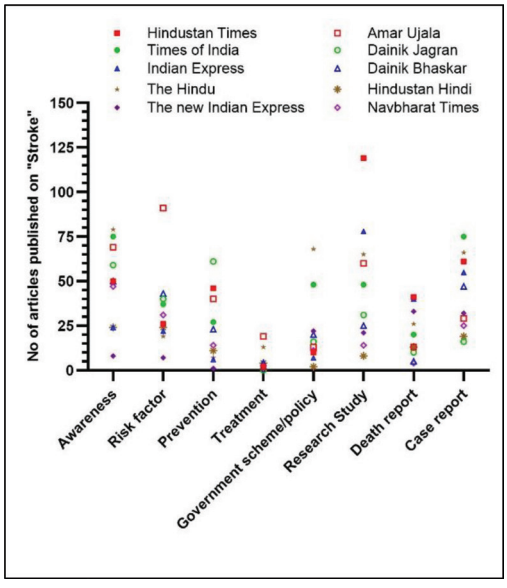


Figure 4: Year-wise Trend of Articles in Different Newspapers

3.3. Language-Wise Trend

English newspapers exhibited more coverage (n=1391; 57.3%) about stroke as compared to Hindi newspapers (n=1036; 42.7%). The chi-square test found a significant association with χ^2 (7) =251, p < .001, with a moderate size effect (Cramer's V= 0.321) (Table 2). Hindi newspapers significantly over-represent risk factors (z=9.92), prevention (z=6.68), and awareness (4.31). While English newspapers focused on research studies (z=6.46), death reports (z=6.27), case reports (z=4.90), and government schemes and policies (z=4.41).

3.4. Newspaper-Wise Trend

Beyond broader language differences, individual newspapers also have distinct focuses, as mentioned in Table 3. In general terms, The Hindu, The Times of India, and The New Indian Express prioritize government schemes and policies. Hindustan Times and Indian Express published more articles on research studies and

death reports. Among Hindi newspapers, Dainik Jagran focused on prevention and awareness, while the major focus of the rest of the newspapers was observed to be risk factors (Table 4).

Table 3: Thematic Area Wise Distribution of Articles among Different Newspapers

Newspaper	Frequency and Percentage*	Awareness	Risk Factor	Prevention	Treatment	Government Scheme/Policy	Research Study	Death Report	Case Report	Total
Hindustan Times	Observed	50	26	46	2	10	119	41	61	355
	Expected	70.9	49.7	34.5	7.31	31.74	68.6	29.99	62.2	355
	% Within Row	14.10%	7.30%	13.00%	0.60%	2.80%	33.50%	11.50%	17.20%	100.00%
	% Within Column	10.30%	7.60%	19.50%	4.00%	4.60%	25.40%	20.00%	14.40%	14.60%
Times of India	Observed	75	37	27	2	48	48	20	75	332
	Expected	66.3	46.5	32.3	6.84	29.68	64.2	28.04	58.1	332
	% Within Row	22.60%	11.10%	8.10%	0.60%	14.50%	14.50%	6.00%	22.60%	100.00%
	% Within Column	15.50%	10.90%	11.40%	4.00%	22.10%	10.20%	9.80%	17.60%	13.70%
Indian Express	Observed	24	22	6	2	7	78	40	55	234
	Expected	46.8	32.8	22.8	4.82	20.92	45.2	19.77	41	234
	% Within Row	10.30%	9.40%	2.60%	0.90%	3.00%	33.30%	17.10%	23.50%	100.00%
	% Within Column	4.90%	6.50%	2.50%	4.00%	3.20%	16.60%	19.50%	12.90%	9.60%
The Hindu	Observed	79	19	7	13	68	65	26	66	343
	Expected	68.5	48.1	33.4	7.07	30.67	66.3	28.97	60.1	343
	% Within Row	23.00%	5.50%	2.00%	3.80%	19.80%	19.00%	7.60%	19.20%	100.00%
	% Within Column	16.30%	5.60%	3.00%	26.00%	31.30%	13.90%	12.70%	15.50%	14.10%
The New Indian Express	Observed	8	7	1	3	22	21	33	32	127
	Expected	25.4	17.8	12.3	2.62	11.36	24.5	10.73	22.2	127
	% Within Row	6.30%	5.50%	0.80%	2.40%	17.30%	16.50%	26.00%	25.20%	100.00%
	% Within Column	1.60%	2.10%	0.40%	6.00%	10.10%	4.50%	16.10%	7.50%	5.20%
Amar Ujala	Observed	69	91	40	19	13	60	13	29	334
	Expected	66.7	46.8	32.5	6.88	29.86	64.5	28.21	58.5	334
	% Within Row	20.70%	27.20%	12.00%	5.70%	3.90%	18.00%	3.90%	8.70%	100.00%
	% Within Column	14.20%	26.80%	16.90%	38.00%	6.00%	12.80%	6.30%	6.80%	13.80%

Dainik Jagran	Observed	59	40	61	0	16	31	10	16	233
	Expected	46.6	32.6	22.7	4.8	20.83	45	19.68	40.8	233
	% Within Row	25.30%	17.20%	26.20%	0.00%	6.90%	13.30%	4.30%	6.90%	100.00%
	% Within Column	12.20%	11.80%	25.80%	0.00%	7.40%	6.60%	4.90%	3.80%	9.60%
Dainik Bhaskar	Observed	50	43	23	4	20	25	5	47	217
	Expected	43.4	30.4	21.1	4.47	19.4	41.9	18.33	38	217
	% Within Row	23.00%	19.80%	10.60%	1.80%	9.20%	11.50%	2.30%	21.70%	100.00%
	% Within Column	10.30%	12.60%	9.70%	8.00%	9.20%	5.30%	2.40%	11.10%	8.90%
Hindustan Hindi	Observed	24	24	11	4	2	8	13	19	105
	Expected	21	14.7	10.2	2.16	9.39	20.3	8.87	18.4	105
	% Within Row	22.90%	22.90%	10.50%	3.80%	1.90%	7.60%	12.40%	18.10%	100.00%
	% Within Column	4.90%	7.10%	4.70%	8.00%	0.90%	1.70%	6.30%	4.50%	4.30%
Navbharat Times	Observed	47	31	14	1	11	14	4	25	147
	Expected	29.4	20.6	14.3	3.03	13.14	28.4	12.42	25.7	147
	% Within Row	32.00%	21.10%	9.50%	0.70%	7.50%	9.50%	2.70%	17.00%	100.00%
	% Within Column	9.70%	9.10%	5.90%	2.00%	5.10%	3.00%	2.00%	5.90%	6.10%
Total	Observed	485	340	236	50	217	469	205	425	2427
	Expected	485	340	236	50	217	469	205	425	2427
	% Within Row	20.00%	14.00%	9.70%	2.10%	8.90%	19.30%	8.40%	17.50%	100.00%
χ^2= 656, **df=63, p <.001; Cramer's V=0.197**										

*Row represents the Newspaper and Column represents the thematic categories of newspaper articles.

Table 4: Post Hoc Analysis of Thematic Area Wise Distribution of Articles among Different Newspapers

Post Hoc Test (Standardized residuals)									
Newspaper	**Awareness**	**Risk Factor**	**Prevention**	**Treatment**	**Government Scheme/ Policy**	**Research Study**	**Death Report**	**Case Report**	**Major Focused Area**
Hindustan Times	-3.008	-3.93	2.2257	-2.149	-4.377	7.332	2.275	-0.176	Research Study, Death report and Prevention
Times of India	1.279	-1.62	-1.0534	-2.013	3.792	-2.417	-1.708	2.621	Government scheme/policy and Case report
Indian Express	-3.915	-2.14	-3.8888	-1.366	-3.355	5.710	5.004	2.538	Research Study, Death report and Case report

The Hindu	1.524	-4.88	-5.1828	2.434	7.624	-0.189	-0.623	0.910	Government scheme/policy and Treatment
The New Indian Express	-3.962	-2.83	-3.4917	0.246	3.401	-0.818	7.301	2.341	Government scheme/policy and Death report
Amar Ujala	0.332	7.51	1.4959	5.027	-3.482	-0.678	-3.223	-4.572	Risk factor and Treatment
Dainik Jagran	2.143	1.46	8.9170	-2.328	-1.167	-2.448	-2.399	-4.496	Prevention and Awareness
Dainik Bhaskar	1.181	2.58	0.4560	-0.236	0.149	-3.051	-3.410	1.685	Risk factor
Hindustan Hindi	0.753	2.67	0.2660	1.290	-2.583	-3.106	1.482	0.161	Risk factor
Navbharat Times	3.751	2.55	-0.0845	-1.215	-0.639	-3.105	-2.576	-0.166	Awareness and Risk factor

Standardized Residual Analysis ($Z > 1.96$) indicates statistical significance at $p < 0.05$).
$Z > 1.96$ Significantly *more* cases than expected.
$Z < 1.96$ Significantly *less* cases than expected.

4. Discussion

The present study provides a comprehensive 12-year longitudinal evaluation of stroke-related print media coverage in India, assessing 2,427 articles across ten leading English and Hindi national newspapers. The findings highlighted not only an increasing trend for stroke reporting, particularly accelerating after 2017, but also revealed pronounced structural asymmetries in how stroke is communicated to the public.

The longitudinal trajectory between 2012 and 2024 demonstrates a marked escalation in media attention toward stroke, reflecting India's shifting epidemiological landscape. India is experiencing a rising burden of non-communicable diseases (NCDs), especially stroke, as one of the leading causes of death and disability (Jones *et al.,* 2022). This escalating trend corresponds with various real-world health milestones, including the establishment of the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke (NPCDCS), and expanding national health initiatives such as Ayushman Bharat–Pradhan Mantri Jan Arogya Yojana (AB-PMJAY), which is the central government scheme available nationwide in India for treatment purposes, covering all Indian citizens.

A major finding of the study is the unequal distribution of articles under different themes. The maximum number of articles published were related to awareness, research studies, case reports, and risk factors, while other areas were less represented. Case reports and death reports were largely triggered by the demise of prominent public or political figures, underscoring the media's tendency toward episodic and sensationalist framing. While celebrity illness reports can temporarily elevate public awareness, they frequently fail to provide actionable medical advice. Very low coverage about treatment modalities may leave the readers uninformed about the possible acute interventions, emergency helpline protocols, and post-stroke rehabilitation. From an emergency public health standpoint, these discrepancies represent a severe communication deficit.

The significant association between publication language and thematic focus reveals two distinct paradigms of health journalism in India. English newspapers adopt a clinical and policy-oriented framing emphasizing academic biomedical research, government healthcare schemes, clinical case reviews, and mortality events. While Hindi newspapers adopt a preventive/risk factor orientation, focusing on day-to-day risk management, actionable health habits, and foundational awareness.

These empirical findings demonstrate that while print newspapers are an active medium for stroke awareness, their efficacy as tools of health promotion is hindered by fragmented messaging. Previous studies have shown that stroke education through mass media campaigns can change the public awareness and action, allowing them early access to treatment and positive outcomes (Bartley *et al.,* 2009; Lecouturier *et al.,* 2010). There are reports that many people, even if they recognize the symptoms of a stroke, do not go to the hospital directly due to multiple reasons, such as lack of knowledge, understanding the urgency of treatment, or preferring local healers or non-clinical persons (Wainwright *et al.,* 2017). These misconceptions often lead to delay or no treatment and hinder rehabilitation of stroke survivors to a normal life. Therefore, there is a need to optimize the

newspapers as public health communication media. This can be done by closing the acute care communication gap and focusing on missing areas such as the course of action to be followed after a stroke, the importance of the crucial time window of treatment, the possibility of treatment, post-stroke rehabilitation therapies, government policies that might help, the responsibility of caretakers and society, etc. There is also a need for bridging the linguistic divide, and equal distribution of different themes is essential for holistic community awareness.

5. Limitations

There are several limitations that must be considered while interpreting the results. This analysis was restricted to selected high-circulation print/online newspapers and may not reflect coverage across regional, local, or specialized community-based publications, where stroke prevalence and health infrastructure vary substantially. Furthermore, the non-inclusion of social/digital media platforms, which increasingly serve as primary health information sources, especially for younger populations, has a direct impact on health literacy among audiences. Further, the study examined media content and framing patterns rather than public reception or behavioral impact. Therefore, no direct causal inferences can be drawn regarding how this coverage shapes public knowledge, health-seeking behaviors, or clinical outcomes.

6. Conclusion

The print media in India remain a vital yet underutilized medium for stroke education. Though national newspapers could spread knowledge about stroke and its consequences, measuring the impact of communication strategies through newspapers to prevent/manage stroke at the regional levels is a matter of further investigation. Addressing the critical void in acute treatment information and harmonizing preventive literacy with policy awareness will be essential if newspapers are to support the overall stroke awareness at community levels.

Acknowledgements

The authors express their sincere gratitude to the Director of CSIR–National Institute of Science Communication and Policy Research (CSIR-NIScPR) for providing the necessary support and facilities to carry out this study. The authors also acknowledge the financial support received from the Council of Scientific and Industrial Research (CSIR), New Delhi. The authors further extend their appreciation to Garima, Project Associate at CSIR-NIScPR, New Delhi, for her valuable support and assistance in completing the study.

Author Contributions

Pratibha Maan: Literature search, methodology, data acquisition, data analysis, statistical analysis, writing – original draft, and writing – review and editing.
Suman Ray: Conceptualization, writing – original draft, validation, writing – review and editing, resources, supervision, and funding acquisition.
Chandrashekhar Chavan: Literature search, data acquisition, data analysis, and writing – original draft.
All authors reviewed and approved the final version of the manuscript.

Funding

This study was funded by the Council of Scientific and Industrial Research (CSIR), New Delhi, under grant number CSPS24/RDSF/NIScPR/IHP24/01.

Ethical Approval

This article does not report any studies involving human participants conducted by the authors. Therefore, ethical approval and informed consent were not required.

Conflict of Interest

The authors declare that they have no conflicts of interest.

Human and Animal Rights

This article does not contain any studies involving human participants or animals conducted by the authors.

Data Availability Statement

The datasets generated and/or analyzed during the current study are available from the corresponding author (Ray, S.) upon reasonable request.

Figure Permissions

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AI Disclosure Statement

No generative artificial intelligence (AI) or AI-assisted technologies were used in the writing, data analysis, or preparation of any materials for this manuscript.

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