International Journal of Science and Healthcare Research
[Indexed, Peer-Reviewed Journal]
Vol. 11; Issue: 1; Jan.-March 2026
Website: ijshr.com
Original Research Article *ISSN: 2455-7587*

Profile of Snake Bite Deaths Autopsied at a Tertiary Care Centre in the Year 2023

S. Angayarkanni[1]

[1]Associate Professor, Department of Forensic Medicine, Government Chengalpattu Medical College, The Tamil Nadu Dr. M.G.R. Medical University, Chengalpattu, Tamil Nadu, India.

Corresponding Author: Dr. S. Angayarkanni

DOI: https://doi.org/10.52403/ijshr.20260104

ABSTRACT

Objective: To create a socio-demographic profile of snake bite envenomation deaths autopsied at a tertiary care centre in the year 2023.

Methods: Cross sectional study of data collected from the police requests for autopsy and history of the cases from department of forensic medicine and toxicology

Results: In the year 2023, 52 dead bodies were autopsied with history of snake bite envenomation. Males appear to be the group most likely to die from a snake bite, 2.25 times more than females. The analysis of snake types revealed a notable prevalence of unidentified species (51.92%), while kraits (21.15%), vipers (15.38%) and cobras (11.54%) were also identified as other contributors to fatal bites. Seasonal trends indicated a higher incidence during the monsoon season (55.77%), with evenings (6 pm to 12 am) being the most common time frame for such incidents (36.54%). Indoor environments were identified as the primary location for these fatal encounters (50.00%). Lower extremities were the most frequently affected body parts (57.69%) followed by upper extremities (36.54%), emphasizing the vulnerability of limbs during such encounters. Among the occupational groups, farmers were disproportionately affected, representing over half of the cases (51.92%).

Conclusions: This study provides valuable insights into the epidemiology of fatal snake bites, highlighting the demographic, seasonal, and environmental factors that contribute to these incidents. By addressing these factors through targeted interventions, it is possible to reduce the impact of snake bites on public health and improve outcomes for victims

Keywords: Snake Bite, Fatal, Farmers, Toxicology, Snake envenomation, Autopsy

INTRODUCTION

Snakebite remains a significantly important public health issue in many tropical and subtropical countries. Globally, an estimated 5.4 million people are bitten by snakes each year, leading to 1.8 to 2.7 million cases of envenomation. These bites result in approximately 81,410 to 137,880 deaths annually, with nearly three times as many victims suffering amputations or permanent disabilities[1].

In India alone, snake envenomation accounts for nearly 45,000 deaths each year, with around 10,000 of these fatalities occurring in Tamil Nadu[1]. However, the actual number of cases may be far higher due to cultural beliefs, taboos, and limited

access to healthcare and factors which often prevent victims from seeking medical attention. The seventh meeting of Mission steering Group of National Health Mission discussed about the awareness and capacity for prevention and control of snakebite[2]. Union Health Ministry of India has launched national action plan for prevention and control of snakebite envenoming in India[3]. India is the first country to launch a National control plan for prevention and control against snake envenomation[4]. Snake bite cases in Tamil Nadu from 2020 to 7 Nov 2024 were 77,412 and the fatalities were 81. In a significant move to tackle the public health challenge of snakebites, the Tamil Nadu government has officially declared snakebite envenomation as a notifiable disease under the Tamil Nadu Public Health Act, 1939. A Government Order was issued in this regard by the Health and Family Welfare department on November 4, following which a notification was published in the Tamil Nadu Government Gazette on November 6 2024. Snakebite envenomation is a neglected tropical disease[5]. India is the country with the highest annual number of envenomings (81,000) and deaths (nearly 11,000). Farmers, labourers, soldiers, animal herd workers/snake charmers, forest-dwelling tribes, and people sleeping on the floor are at the highest risk of getting bitten by snakes. For effective prevention, education and awareness campaigns against snakebites are needed[6].

This study aims to create a demographic and clinical profile of individuals who succumbed to snake envenomation and underwent medico-legal autopsy during the year 2023.

MATERIALS & METHODS

This Cross-sectional study was carried out at the Department of Forensic Medicine in a Tertiary Care Centre which serves the districts of Chengalpattu, Kanchipuram, Tiruvannamalai and South Chennai. The study was conducted over a period of 1 year, from January to December months of year 2023. Approval of study was obtained from Institutional Ethics Committee.

The data regarding snake bite death victims subjected to autopsies were collected from hospital records, police requisition and post-mortem reports. All the other bites other than snake bite were excluded from the study. Data were obtained in relation type of snake, site of bite, place and time of bite, activity during the bite and socio-demographic profile of victims.

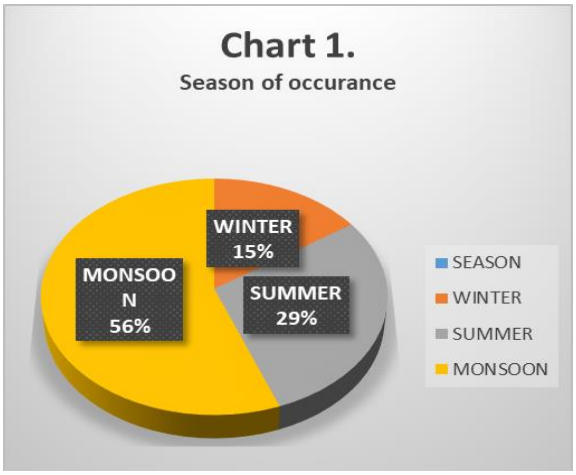
RESULT

Out of 2026 autopsies performed in the study period, 52 cases were of fatal snake bite envenomation comprising 2.56%. The study predominantly comprised male individuals (69.23%), with a significant portion being married (76.92%). The age distribution highlighted a substantial impact on individuals between 51 to 60 years old (28.85%). Among the occupational groups, farmers were disproportionately affected, representing over half of the cases (51.92%) (Table 1). Seasonal trends indicated a higher incidence during the monsoon season (55.77%), with evenings (6 pm to 12 am) being the most common time frame for such incidents (36.54%) and Indoor environments were identified as the primary location for these fatal encounters (50.00%) (Table 2). The analysis of snake types revealed a notable prevalence of unidentified species (51.92%), while kraits (21.15%), vipers (15.38%) and cobras (11.54%) were also identified as other contributors to fatal bites (Table 3). Activities at the time of the snake bites varied, with a significant number occurring while individuals were working on farms (40.38%) and others while lying down (32.69%) (Table 4). Lower extremities were the most frequently affected body parts (57.69%) followed by upper extremities (36.54%), emphasizing the vulnerability of limbs during such encounters. Only 3 cases of bite over head and neck were reported (Table 5). This detailed analysis provides valuable insights into the demographics,

seasonal variations, and circumstances surrounding fatal snake bites

Table 1: Demographic Profile of fatal snakebite

	n	%
Total number of autopsies	2026	100
Total fatal snake bites	52	2.57
Sex		
Male	36	69.23
Female	16	30.77
Marital status		
Married	40	76.92
Unmarried	12	23.08
Age		
0 to 10	4	7.69
11 to 20	8	15.38
21 to 30	7	13.46
31 to 40	3	5.77
41 to 50	5	9.62
51 to 60	15	28.85
More than 60	10	19.23
Occupation		
Farmer	27	51.92
Student	6	11.54
House wife	6	11.54
Others	13	25.00
Identification of snake		
Seen	25	48.08
Not seen	27	51.92



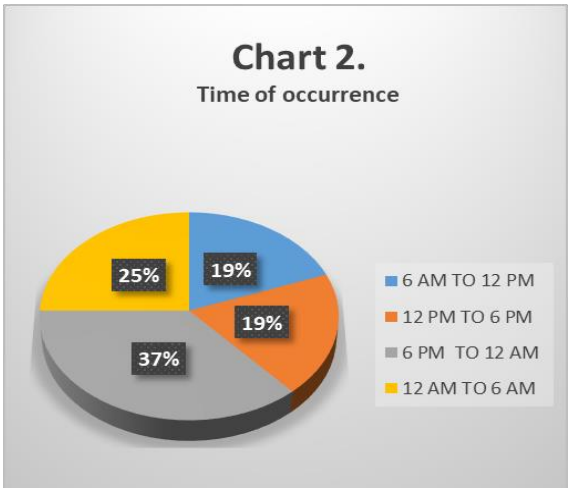


Table 2: Distribution in relation to season, time and place of occurrence

	n	%
Season		
Winter	8	15.38
Summer	15	28.85
Monsoon	29	55.77
Time		
6 am to 12 pm	10	19.23
12 pm to 6 pm	10	19.23
6 pm to 12 am	19	36.54
12 am to 6 am	13	25.00
Place of occurrence		
Farm	23	44.23
Street	3	5.77
Indoor	26	50.00
Jungle	0	0.00

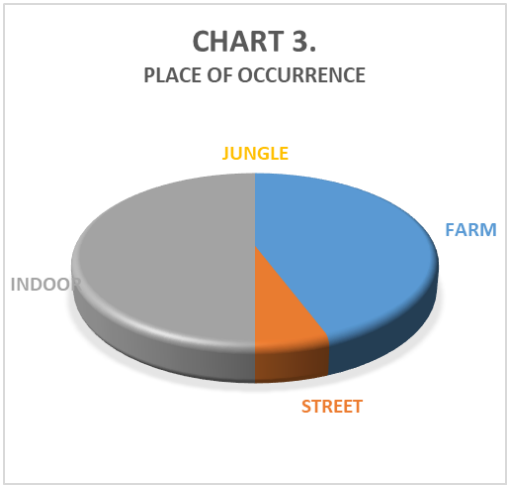


Table 3: Cases according to type of snake

Type of Snake	n	%
Viper	8	15.38
Krait	11	21.15
Cobra	6	11.54
Unknown	27	51.92

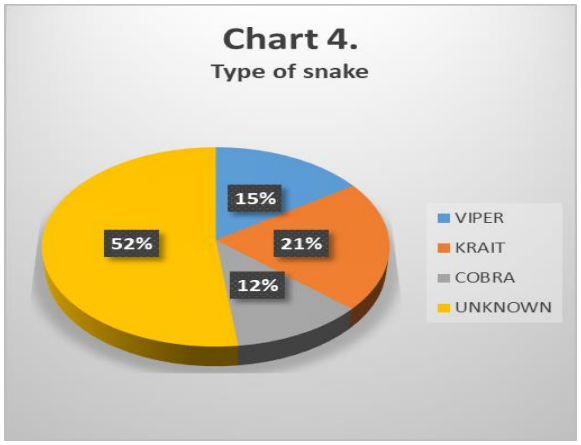


Table 4: Activities during bite

	n	%
Working at farm	21	40.38
Walking	2	3.85
Working at house	9	17.31
Playing	3	5.77
Lying	17	32.69

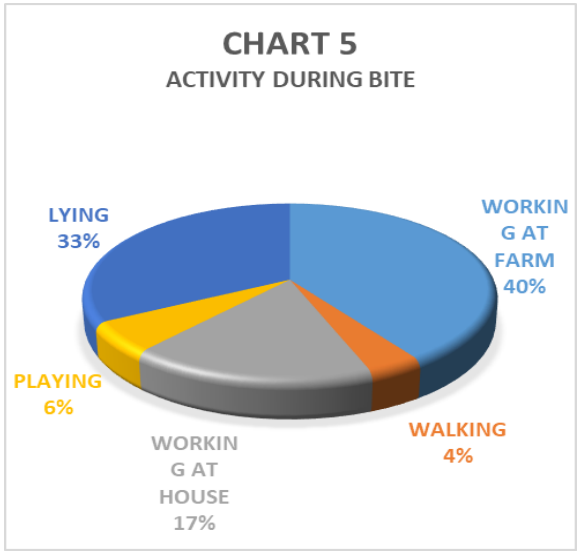
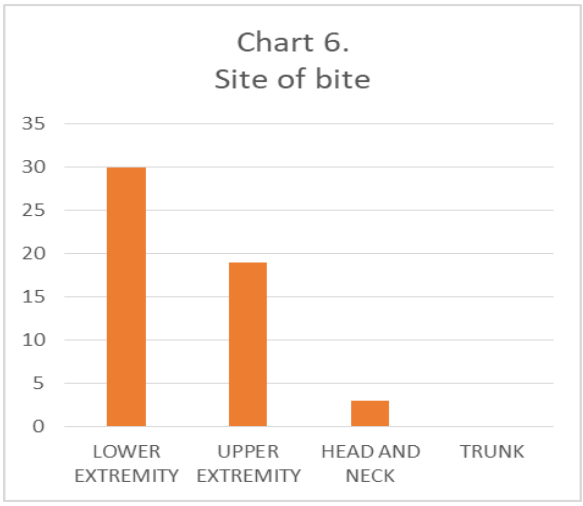


Table 5: Site of bite

	n	%
Lower extremity	30	57.69
Upper extremity	19	36.54
Head and neck	3	5.77
Trunk	0	0.00



DISCUSSION

This study provides critical insights into the epidemiology of fatal snake bites through a detailed analysis of 52 autopsies conducted in 2023 comprising 2.57 % of all autopsies done in the hospital mortuary. This is slightly more than the studies done by many researchers [7-10,23,24] but lesser than observed by Mohapatra and Warrel[11], Hati and Mandal[24] and Ganeeru B et al[25].

The demographic profile of the victims, characterized by a predominance of males and married individuals. Similar observations were made in studies conducted by Yogesh and Satish in Bangalore in 2014[12], Suchitra N et al in Kerala in 2008[13], Hati & Mandal in Burdwan[24], Ganneru B & Sasidhar RB in Andhra Pradesh in 2007[25], Minakshi[28] and Umakantha Mahapatra et al[30].

The study also aligns with previous research suggesting that occupational and behavioural factors significantly influence exposure to snake habitats. Notably, the high proportion of farmers among the victims due to the occupational risk inherent in agricultural work, where contact with snakes is more likely which were found in the studies conducted by Suraweera et al[14], Warrel DA[15], Saro Babo Martins et al[16], Minakshi[28] and Umakantha Mahapatra et al[30].

The age distribution, with a peak incidence in the 51–60 year age group, indicates that older individuals may be more vulnerable to fatal outcomes following envenomation. Studies conducted by Patil et al[17] and Kshirsagar et al[18] have shown that this trend may be attributed to age-related factors such as decreased mobility and slower reaction times, which can delay avoidance or access to timely medical care.

A notable challenge identified in this study is the frequent inability to determine the snake species involved in envenomation. Accurate species identification is critical for selecting appropriate treatment, particularly the administration of species-specific antivenoms which was depicted in a study conducted by Bawaskar HS[19]. Study carried out by Bhalla G et al[20] and Minakshi[28] offered the value of enhancing snake identification skills among healthcare professionals and educating the public could facilitate more effective and timely interventions.

The study also reveals seasonal variations, with a higher incidence of snake bites during the monsoon season. This pattern is consistent with previous findings found in a study conducted by Sinha et al[21] and may be due to increased snake activity and changes in human behaviour, such as heightened agricultural engagement during this period. In a study conducted by Kulkarni et al[22], snakebites were found to abound during the months from May to July (67%) and from October to December (33%). The increased occurrence of bites during evening hours further highlights the need for enhanced awareness and preventive measures during high-risk times. This finding was observed by Ghosh R et al[27] and Minakshi[28].

Lower limbs were the frequently affected body parts followed by the upper extremities. Similar findings were noted in a study conducted by Minakshi[28], Umakantha Mahapatra et al[30], Shetty AK et al[31] and Hansdak SG et al[32]. The frequent targeting of lower extremities as bite sites was found in a similar study by Chippaux JP et al[33] further supports the need for protective footwear and clothing, especially in snake-endemic regions.

CONCLUSION

This study offers valuable epidemiological insights into fatal snake bites, emphasizing the interplay of demographic, environmental, and seasonal factors. By addressing these aspects through focused public health interventions, the burden of snake bites can be mitigated, leading to improved outcomes for affected individuals.
These findings have significant implications for public health strategies aimed at reducing snake bite-related mortality. This study depicts an occupational risk and a seasonal incidence of snake-bite. High risk population should be educated through targeted educational campaigns thereby raising awareness about prevention strategies and the urgent need for prompt medical treatment. Most of the snake bites are under reported as people in rural areas seek local treatment by non-medical methods. Villagers and high risk population should be taught to identify the species of snake.
WHO's snakebite envenoming strategy for prevention and control aims to drive creating revolving stockpile of anti-venoms that can be sent to needed centres. The treating medical officers should be trained to identify the snake species, early diagnosis of clinical manifestation and correct dose of anti-snake venom. Patient presented to primary health centres and district hospitals should be referred to higher institutions only after administering anti-snake venom. Standard treatment guidelines in management of snake bites prescribed by Ministry of Health and Family Welfare, Government of India should be strictly adherent to.

Declaration by Authors
Ethical Approval: Approved
Acknowledgement: None
Source of Funding: The author received no financial support for the research, authorship, and/or publication of this article
Conflict of Interest: The author declares no potential conflicts of interests with respect to research, authorship, and/or publication of this article

REFERENCES

1. WHO – Key facts on Snakebite envenoming dated 12 September 2023
2. *Dr Mansukh Mandaviya chairs 7th meeting of Mission Steering Group for NHM. Available from:* https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1857490
3. Union health ministry launches national action plan for prevention and control of snakebite envenoming in India – an initiative to halve the snakebite deaths by 2030 through 'one health' approach. Available from: https://pib.gov.in/pib.gov.in/Pressreleasehare.aspx?PRID=2013803
4. National action plan for prevention and control of snakebite envenoming (NAPSE). Available from: https://ncdc.mohfw.gov.in/wp-content/uploads/2024/07/NATIONAL-ACTION-PLAN-FOR-PREVENTION-AND-CONTROL-OF-SNAKEBITE-ENVENOMING-NAPSE.pdf
5. The Lancet : Snake-bite envenoming: a priority neglected tropical disease, Volume 390, Issue 10089P2July 01, 2017 DOI: 10.1016/S0140-6736(17) 31751-8
6. Kasturiratne A, Wickremasinghe AR, de Silva N, Gunawardena NK, Pathmeswaran A, Premaratna R, et al. The global burden of snakebite: A literature analysis and modelling based on regional estimates of envenoming and deaths. PLoS Med. 2008 Nov;5(11):e218.
7. Navinkumar M. Varma & P. R. Kulkarni, Postmortem study of Snake Bite cases. International Journal of Current Medical And Applied Sciences, 2017, October, 16(2), 110-116.
8. Manigandan G, Selvaraj T, Epidemiological Profile of deaths due to snake bite at Tertiary care Hospital, South India, Indian Journal of Forensic Medicine & Toxicology, July-December 2016,10 [2], 155-158.
9. V Yogiraj, R.Chaitanya, Vijaykumar B Jatti, Anand N Patil, C.Bharat, A study of Post Mortem Histopathological findings in snake bite poisoning, 2013, 13(1), 203-208
10. Joshi Subhash, Prakash Chandra ,Joshi Arun, Joshi Godawari, Nigam Pranesh, Profile of Snakebitecases admitted at a Tertiary care centre, Journal of Indian Academy of Forensic Medicine, 2012,34,[3], 217-219.
11. Mohapatra B, Warrell DA, Suraweera W, Bhatia P, Dhingra N, Jotkar RM, et al. Snakebite mortality in India: A nationally representative mortality survey. PLoS Negl Trop Dis. 2011 Apr;5(4):e1018.
12. Dr Yogesh C., Dr Satish K. V. Study of Clinico-Pathological Profile of Renal Changes in Snake Bite Cases for a Period of 18 Months Reported to Victoria Hospital, Bangalore, International Journal of Scientific and Research Publications, Volume 4, Issue 8, August 2014 ISSN 2250-3153
13. Suchithra N, Pappachan JM, Sujathan P. Snakebite envenoming in Kerala, Southern India: the clinical profile and the factors which are involved in the adverse outcomes. Emerg Med J. 2008;25:200–04. doi: 10.1136/emj. 2007.051136
14. Suraweera W, Warrell D, Whitaker R, Menon G, Rodrigues R, Fu SH, et al. Trends in snakebite deaths in India from 2000 to 2019 in a nationally representative mortality study. eLife. 2020;9:e54076
15. Warrel DA. The WHO/SEARO guidelines for the clinical management of snake bite in the South East Asian region. SE Asian J Trop Med Pub Hlth 1999:30:1-85
16. Sara Babo Martins, Isabelle Bolon, François Chappuis, Nicolas Ray, Gabriel Alcoba, Carlos Ochoa, Sanjib Kumar Sharma, Armand S Nkwescheu, Franck Wanda, Andrew M Durso , Rafael Ruiz de Castañeda, Snakebite and its impact in rural communities: The need for a One

Health approach, PLoS Negl Trop Dis. 2019 Sep 26;13(9):e0007608. doi: 10.1371/ journal pntd.0007608
17. Patil TB, Patil MB, Durgawale PM, Patil AG. Clinical profile and outcome of patients with snakebite in a tertiary care setup. J Clin Diagn Res. 2016;10(10): OC13–OC17.
18. Kshirsagar VY, Ahmed M, Colaco SM. Clinical profile of snakebite in children in rural India. Iran J Pediatr. 2013;23(6):632–6.
19. Bawaskar HS, Bawaskar PH. Snake bite: an overview. Indian J Crit Care Med. 2014;18(7):427-30.
20. Bhalla G, Mhaskar D, Agarwal A. A retrospective study of snake envenomation in a tertiary care centre in Gujarat: clinical profile and outcome. J Indian Med Assoc. 2012;110(11):737-9.
21. Sinha A, Narang RK. Epidemiological profile of snake bite cases in a tertiary care hospital in Jharkhand, India. Int J Community Med Public Health. 2018;5(5):1961-4.
22. Kulkarni ML, Anees S. Snake venom poisoning: experience with 633 cases. Indian Pediatr. 1994;31(10):1239-43.
23. Nabanita Juin, Joydeep Khan, Nirmalya Chakrabarti, Aniruddha Das, Gowtham, Amrita Ghosal, Surya Udayakumar, Partha Sarathi Hembram, an autopsy based Cross sectional Original Research on Demographic Profile of Fatal Snake Bite Cases in a Medical College of West Bengal, Volume 14 Issue 5 (Sept – Oct,2024), Pages 219 – 226
24. Hati AK, Mandal M, De MK, Mukherjee H, Hati RN. The epidemiology of snake bites in the district of Burdwan, West Bengal. J Indian Med Assoc. 1992 Jun;90 (6):145–47.
25. Ganneru Brunda & R.B. Sashidhar Epidemiological profile of snake- bite cases from Andhra Pradesh using immunoanalytical approach
26. Sharma SK, Chappuis F, Jha N, Bovier PA, Loutan L, Koirala S. Impact of snake bites and determinants of fatal outcomes in southeastern Nepal. Am J Trop Med Hyg. 2004 Nov;71(2):234–8.
27. Ghosh R, Mana K, Gantait K, Sarkhel S. A retrospective study of clinico-epidemiological profile of snakebite related deaths at a Tertiary care hospital in Midnapore, West Bengal, India. Toxicol Rep. 2017 Nov 24;5:1-5. doi: 10.1016/j.toxrep.2017.11.008. PMID: 29234603; PMCID: PMC5723283.
28. Minakshi Sardha, Epidemiological Profile of Snake Bite at Tertiary Care Hospital, North India, 2012, Journal of Forensic Research, https://doi.org/10.4172/2157-7145.1000146
29. Kumar SM, Shreekrishna HK, Singi Y. Clinico-epidemiological profile and outcome of snakebite patients presented to a teaching institute - A descriptive retrospective review. J Family Med Prim Care. 2024 Jan;13(1):151-156. doi: 10.4103/jfmpc.jfmpc_743_23.
30. Umakanta Mahapatra, Dhirendra Tejpratap Singh, Joydip Datta, Bikas Chandra Seth, Prashant Kumar Mandal, Jugal Kishore Kar, Clinico-epidemiological Profile of Snake Bite in a Rural Tertiary Care Hospital of West Bengal, J Indian Med Assoc 2023; 121(9): 44-9
31. Shetty AK, Jirli PS. Incidence of Snake bites in Belgaum. J Indian Acad Forensic Med. 2010:32(2):139-141.
32. Hansdak SG, Lallar KS, Pokharel P, Shyangwa P, Karki P, Koirala S. A Clinico-epidemiological study of snake bite in Nepal. Trop Doct. 1998;28(4):223–226. doi: 10.1177/004947559802800412.
33. Chippaux JP, Warrell DA, White J. Snake venom variability: methods of study, results and interpretation. Toxicon. 1991; 29(11):1279–1303.

How to cite this article: S. Angayarkanni. Profile of Snake Bite Deaths Autopsied at a Tertiary Care Centre in the Year 2023. *Int. J. Sci. Healthc. Res.* 2026; 11(1): 41-47. DOI: *https://doi.org/10.52403/ijshr.20260104*

******