

EDUCATION REGARDING EARLY DETECTION AND EARLY TREATMENT OF BRAIN TUMORS IN BANYUWANGI REGENCY, INDONESIA

Rahadian Indarto Susilo^{1,3*}, Irwan Barlian Immadoel Haq^{1,3}, Tedy Apriawan^{1,3}, Joni Wahyuhadi^{1,3}, Septa Indra Puspikawati², Erica Medina Ramadhaningtyas^{1,3}

¹ Department of Neurosurgery, Faculty of Medicine, Universitas Airlangga, Indonesia

² Public Health Study Program, Faculty of Health, Medicine and Life Science, Universitas Airlangga, Indonesia

³ Dr. Soetomo General Academic Hospital, Indonesia

Corresponding Author: rahadian-i-s@fk.unair.ac.id

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ABSTRACT

Brain tumors were estimated to occur at 6.4 per 100,000 people each year. The incidence rate of brain tumors in children is reported to be 5.7% out of every 100,000 children, while in adults, the reported rate is significantly higher at 29.9% out of every 100,000 people. Banyuwangi Regency has an area of 5,782.50 km² with a population in 2018 of 1,609,677 people with a density of around 278 people/km². With such a large population, early detection of brain tumors is important for the public to understand. Early detection activity programs from community health centre need to be held with the hope that health workers will be able to provide education and information regarding early symptoms and signs of brain tumors as well as risk factors for brain tumors for prevention. Increasing public knowledge about alerting the early symptoms of brain tumors is one strategy that can be used to reduce death and disability rates due to brain tumors. The aim of this community service program is to increase the knowledge of the lay public and health workers regarding early detection and early treatment of brain tumors in Banyuwangi Regency. Pre- and post-test questionnaires were given before and after the material to evaluate the increase in knowledge about brain tumors for lay people and health workers in Banyuwangi Regency. The results obtained a significant increase ($p < 0.01$) between the pre-test and post-test scores so that this community service increases the knowledge of the community in Banyuwangi Regency.

Keywords: early detection, early treatment, brain tumors

INTRODUCTION

According to the Global Cancer Observatory (GLOBOCAN) in 2020, brain and central nervous system tumors ranked 19th among the most common types of cancer (1.9% of all cancers) and 12th as the leading cause of cancer death (2.5% of all cancers) (Ilic & Ilic, 2023). Brain tumors are estimated to occur at 6.4 per 100,000 people annually (Perkins *et al.*, 2016). The reported incidence of brain tumors in children is 5.7% of a total of 100,000 children, while in adults the reported incidence is much higher, at 29.9% of a total of 100,000 people (Greuter *et al.*, 2021).

The 2017 Global Burden of Disease (GBD) study showed that brain and central nervous system tumors were the eighth-highest cause of death from cancer-related Years of Life Lost (YLLs) globally in both sexes (Ilic & Ilic, 2023). Between 2001 and 2017, diagnoses of primary brain and malignant central nervous system tumors in the United States had a 5-year relative survival rate of 66.9%. Non-malignant primary brain and central nervous system tumors had a 5-year relative survival rate of 92.1%. In the same time period, individuals aged 15-39 had a higher overall 5-year survival rate compared to individuals aged 0-14 and adults over 40 (Cioffi *et al.*, 2022). Brain tumors are most common in adults aged 55-64, with a slightly higher incidence in men than in women (Ghozali, 2020).

A brain tumor is a collection of cells that grow abnormally and uncontrollably. Brain tumors can be primary tumors or metastases from tumors in other organs (Tan *et al.*, 2020). Primary tumors arise from the primary tissue or covering of the central nervous system. This type of tumor is responsible for high mortality and morbidity and is considered a major public health problem worldwide (Salehpour *et al.*, 2019).

The symptoms of brain tumors vary widely from person to person. They can affect all age groups. Slow-growing tumors may not cause any symptoms, but as they grow, they can cause symptoms. This complicates the diagnosis of brain tumors, and patients often arrive at the hospital with late-stage complications. Brain tumors reduce the patient's quality of life and place a significant social and economic burden on both the patient and their family (Ghozali, 2020).

In Indonesia, particularly in eastern Indonesia, data from a seven-year epidemiological study at Dr. Soetomo General Hospital indicates a relatively high incidence of brain tumors, with over 1,000 patient visits per year. Meningiomas, or tumors of the lining of the brain, dominate the distribution, accounting for 39.2%. Another benign brain tumor, pituitary adenoma, accounts for 12.4%. Malignant brain tumors, glioblastoma, which remain one of the cancers with the highest mortality rate, account for approximately 4.3% of all brain tumor patients (Wahyuhadi *et al.*, 2021).

Regional challenges facing Banyuwangi Regency regarding brain tumors include health and sociocultural issues. Health issues include issues with handling brain tumor cases, including early detection, diagnosis, and appropriate hospital treatment involving multidisciplinary healthcare professionals. Sociocultural issues include public awareness and knowledge regarding early detection of brain tumors and appropriate hospitalization. Although the incidence of brain tumors in Banyuwangi is still rare, prevention and early detection are crucial to ensure that patients arrive at the hospital early enough to receive optimal treatment.

Early symptoms of brain tumors often go unnoticed by both patients and doctors, necessitating a more thorough examination. In Banyuwangi, many residents are unaware of the symptoms of brain tumors. They are often mistaken for other illnesses, leading to their neglect. Early detection of brain tumors can maximize treatment and increase the chances of recovery. Early detection programs, data collection, and reporting from public health centers (Puskesmas) should be implemented from childhood through adulthood. The aim of this community service program is to increase the knowledge of the lay public and health workers regarding early detection and early treatment of brain tumors in Banyuwangi Regency.

FOCUS GROUP DISCUSSION CROSS-SECTORAL

Focus Group Discussion cross-sectoral project to map the problem and formulate solutions to the high incidence of brain tumors in the Banyuwangi region. Servicesty of

Medicine, Universitas Airlangga, and Dr. Soetomo General Hospital, which have become leading teaching hospitals in developing brain tumor services, are proposing this initiative. This initiative will collaborate with experts from the Faculty of Medicine, Universitas Airlangga, Dr. Soetomo General Hospital, Surabaya, and the Indonesian Neurosurgeons Association (PERSPEBSI) for the East Java region to provide guidance in brain tumor services, education, and training, ensuring early detection of brain tumors in accordance with service standards. The participating partners are the Indonesian Doctors Association (IDI) Banyuwangi Branch and PERSPEBSI for the East Java region. The IDI Banyuwangi Branch will be the target partner for early brain tumor detection outreach in Banyuwangi and will gradually continue to disseminate information throughout the Banyuwangi region to serve as a benchmark for future brain tumor early detection programs. PERSPEBSI for the East Java region is the primary partner for implementing the community service program, providing outreach in Banyuwangi and is an initial pilot project involving multidisciplinary healthcare workers in training for early detection and initial treatment of brain tumors. A cross-sector FGD was conducted to determine the location of the activity and prepare the main material to be presented. In synergy with PERSPEBSI, expert neurosurgeons were provided to educate on the symptoms and treatment of brain tumors. The seminar was conducted with the approval of the Banyuwangi Indonesian Doctors Association (IDI) Branch and the Banyuwangi Regency Health Office. The seminar was held at four locations: Banyuwangi Health Office for health workers; the Banyuwangi Health Sciences College (STIKES), Muhammadiyah 1 Elementary School, and the Faculty of Health, Medicine, and Natural Sciences (FIKKIA), Universitas Airlangga for the general public. Each location was consulted and gave approval to hold the seminar.

SEMINAR ON EARLY DETECTION AND INITIAL MANAGEMENT OF BRAIN TUMORS FOR HEALTHCARE PROFESSIONALS

A seminar targeting healthcare professionals was conducted at the Banyuwangi District Health Office, involving general

practitioners, medical specialists, and nurses from various healthcare facilities across Banyuwangi Regency. As frontline providers in the healthcare system, these professionals were selected to enhance their competencies in identifying early symptoms and initiating appropriate management of brain tumor cases. The seminar provided participants with comprehensive materials covering promotive, preventive, and curative approaches. These resources are intended to be disseminated to the broader community to raise awareness about early detection, symptom recognition, and initial treatment strategies for brain tumor malignancies. The seminar was delivered through a combination of lectures and interactive question-and-answer sessions. Prior to the seminar, a pre-test was administered to assess the baseline knowledge of healthcare professionals regarding early detection and initial management of brain tumors. At the conclusion of the seminar, a post-test was conducted to evaluate knowledge improvement (Semedi *et al.*, 2021).

The brain tumor education seminars were conducted at four locations: Banyuwangi College of Health Sciences (Figure 1), Muhammadiyah Elementary School 1 Banyuwangi (Figure 2), Banyuwangi District Health Office (Figure 3), and the Faculty of Health Sciences, Medicine, and Natural Sciences at Universitas Airlangga Banyuwangi Campus (Figure 4). On February 21, 2024, seminars were held featuring Dr. Rahadian Indarto Susilo, dr., Sp.BS(K) from Universitas Airlangga – Dr. Soetomo General Hospital. The seminars took place at the Banyuwangi College of Health Sciences from 08:00 to 10:00 WIB, and at Muhammadiyah Elementary School 1 Banyuwangi from 12:30 to 14:30 WIB. On February 22, 2024, a seminar was conducted at the Banyuwangi District Health Office from 08:00 to 10:00 WIB, featuring speakers Prof. Rob J. M. Groen, MD, PhD from the University of Groningen; dr. Firman Adi Sanjaya, Sp.BS from Blambangan Regional Hospital, Banyuwangi; and Dr. Irwan Barlian Immadoel Haq, dr., Sp.BS(K) from Airlangga University – Dr. Soetomo General Hospital. On the same day, another seminar was held at the Faculty of Health Sciences, Medicine, and Natural Sciences, Universitas Airlangga Banyuwangi Campus from 12:00 to 14:00 WIB, with speakers Prof. Rob J. M. Groen, MD, PhD and

Dr. Rahadian Indarto Susilo, dr., Sp.BS(K). The seminars were attended by 58 healthcare professionals at the Banyuwangi District Health Office. For the general public, attendance included 53 participants at the Banyuwangi College of Health Sciences, 50 participants at Muhammadiyah Elementary School 1 Banyuwangi, and 82 participants at the Faculty of Health Sciences, Medicine, and Natural Sciences, Universitas Airlangga Banyuwangi Campus.



Figure 1. Brain Tumor Education Activity at the Banyuwangi College of Health Sciences
Note: Photo taken with permission



Figure 2. Brain Tumor Education Activity at Muhammadiyah Elementary School 1 Banyuwangi
Note: Photo taken with permission



Figure 3. Brain Tumor Education Activity at the Banyuwangi District Health Office
Note: Photo taken with permission



Figure 4. Brain Tumor Education Activity at the Faculty of Health Sciences, Medicine, and Natural Sciences, Universitas Airlangga
Note: Photo taken with permission

PUBLIC EDUCATION ON EARLY SYMPTOMS AND EARLY DETECTION OF BRAIN TUMORS IN THE GENERAL POPULATION

Community outreach seminars were conducted across three locations in Banyuwangi: The Banyuwangi College of Health Sciences, Muhammadiyah Elementary School 1 Banyuwangi, and the Faculty of Health Sciences, Medicine, and Natural Sciences at Universitas Airlangga, Banyuwangi Campus. The seminar at the Banyuwangi College of Health Sciences was attended by students and faculty members. At Elementary School Muhammadiyah 1 Banyuwangi, participants included teachers, staff, and parents of students. Meanwhile, the seminar held at the Faculty of Health Sciences, Medicine, and Natural Sciences at Universitas Airlangga was attended by lecturers, students, educational personnel, private sector employees, and librarians. The seminar focused on early detection and initial symptoms of brain tumor cases. This initiative aimed to engage community members—particularly those in decision-making roles across various sectors—to actively participate in promotive efforts and early detection of brain tumors, thereby facilitating timely and optimal medical intervention for affected individuals. The activities were conducted using a combination of lectures and interactive question-and-answer discussions. Prior to the seminar, a pre-test was administered to assess participants' baseline knowledge regarding early symptoms and detection of brain tumors. Upon completion of the seminar, a post-test was conducted to evaluate knowledge acquisition (Semedi *et al.*,

2021). Statistical analysis of the pre- and post-test results was undertaken using the t-test method.

This community engagement initiative aimed to educate and equip residents of Banyuwangi Regency with knowledge regarding the early detection and initial management of brain tumors. The seminar received strong enthusiasm from the local community, as evidenced by the improvement in pre-test and post-test questionnaire scores. For this initiative, the research team developed a questionnaire consisting of three sections. Section A collected demographic information; Section B assessed attitudes toward brain tumor awareness among residents of Polo-Jiddari, Maiduguri Metropolis, Borno State; and Section C evaluated domestic waste management practices in the same area. The questionnaire employed a three-point Likert scale and was tailored for both general and medical audiences. A total of 58 medical professionals from the Banyuwangi District Health Office responded to the medical version of the questionnaire. The general version was distributed to 53 participants at the Banyuwangi College of Health Sciences, 50 participants at Muhammadiyah Elementary School 1 Banyuwangi, and 82 participants at the Faculty of Health Sciences, Medicine, and Natural Sciences, Airlangga University Banyuwangi. The results of the questionnaire, which assessed respondents' knowledge and attitudes, were presented in Table 1.

Based on statistical analysis using the t-test presented in Table 1, a significant improvement was observed between the pre-test and post-test scores ($p < 0.01$). This finding indicated that the community outreach program on brain tumors had a measurable impact on public knowledge in Banyuwangi Regency. The percentage difference between pre-test and post-test scores showed an increase of approximately 16% following participation in the seminar. The increased awareness among residents of Banyuwangi regarding brain tumors was expected to reduce the incidence of delayed access to appropriate healthcare services. When individuals can recognize the symptoms of brain tumors, timely and appropriate treatment can be administered. Enhanced public understanding of brain tumors potentially improved overall quality of life in the region. Furthermore, palliative care for

serious and life-threatening conditions should be provided to support the well-being of affected individuals (Asmorowati & Dhamanty, 2020). The improved understanding among participants regarding early detection and initial management of brain tumors was anticipated to help prevent delays in diagnosis and reduce the number of cases in which treatment is initiated too late.

PROVISION OF HEALTH PROMOTION MEDIA

The material on brain tumors used for this community service activity was developed by adopting the results of discussions on the early symptoms of brain tumors in adults and children with several consultant neurosurgeons. Participants at each location were provided with a link for attendance, and the committee subsequently contacted those who had completed the attendance form. For participants interested in the material, the organizing committee will distribute the material presented at the seminar, thereby enhancing the public's knowledge in Banyuwangi Regency about brain tumor awareness. The distribution of the material is intended to facilitate a more profound comprehension of the subject matter, thereby enhancing the capacity of participants who are prepared to become volunteers for the palliative care program (Asmorowati & Dhamanty, 2020). Posters depicting common brain tumor symptoms and pediatric brain tumors were provided to the Banyuwangi Regency Health Office for distribution to all healthcare facilities in Banyuwangi Regency. The educational posters present common and pediatric brain tumor symptoms through visually appealing and straightforward illustrations, facilitating comprehension for the intended audience (Figure 5).



Figure 5. Poster on Common Symptoms of Brain Tumors in Adults and Children

Table 1. Pre-test and Post-test Results of Respondents' Knowledge

Location	Test	Number of Participants (n)	Value (Mean \pm SD)	Percentage Increase (%)	P Value (T-Test)
Health Department	Pre-test	57	6,07 \pm 1,69	28,01	< 0,01*
	Post-test	57	7,77 \pm 1,27		
School of Health Science	Pre-test	52	7,61 \pm 1,50	16,29	< 0,01*
	Post-test	52	8,85 \pm 1,16		
Muhammadiyah 1 Elementary School	Pre-test	49	7,10 \pm 1,69	20,70	< 0,01*
	Post-test	49	8,57 \pm 1,06		
Faculty of Health, Medicine, and Natural Sciences, Universitas Airlangga	Pre-test	82	6,95 \pm 1,88	22,16	< 0,01*
	Post-test	82	8,49 \pm 0,80		

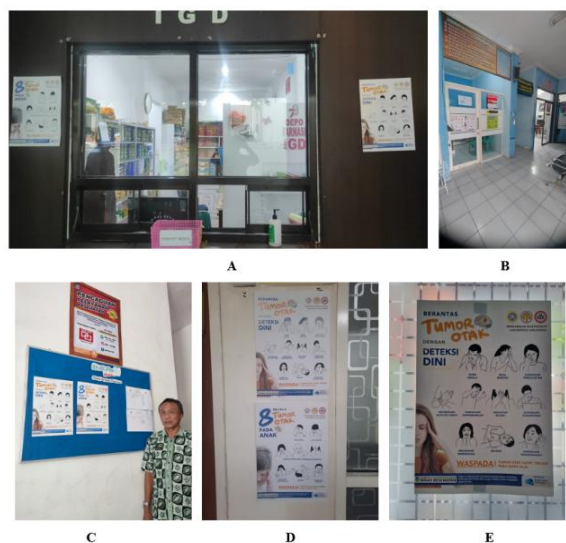
* $p < 0.05$: Significant

Figure 6. Evidence of the distribution of posters on common symptoms of brain tumors in children at various health facilities in Banyuwangi Regency: (A) Blambangan General Hospital, (B) Karangsari Public Health Center, (C) Tampo Public Health Center, (D) Al Huda Hospital, and (E) Yosomulyo Public Health Center
Note: Photo taken with permission

Posters displaying common symptoms of brain tumors in adults and children were distributed at each public seminar venue to be displayed at those locations (Figure 6). The Banyuwangi District Health Office, in collaboration with various health facilities within the district, organized a medical awareness event to highlight the prevalence of brain tumors in the region. The dissemination of posters was a deliberate strategy to augment public education and awareness, with the objective of enhancing health facility utilization.

Participants who attended and filled out the attendance link have been contacted.

Interested participants were provided with seminar materials by the committee. This was done so that participants could more easily understand the information and disseminate it more widely. The Health Department of Banyuwangi Regency has deployed medical personnel from various healthcare facilities across Banyuwangi Regency so that posters detailing general symptoms of brain tumors, including those specific to children, can be distributed to each healthcare facility. These posters will be placed in the areas where medical personnel work, thereby increasing awareness of brain tumors in Banyuwangi Regency (Figure 6).

This community service activity is a collaborative effort involving various parties. The collaboration between the initiators and partners in the health sector aims to detect and manage brain tumors in the Banyuwangi region in line with the SDG indicators, namely Good Health and Well-Being and Partnerships for the Goals. Early detection of brain tumors is essential to ensure more effective management of brain tumors in the Banyuwangi Regency of East Java. Moving forward, healthcare professionals and informed community members will no longer be delayed in providing initial treatment for brain tumors. This community service program involves sharing knowledge about early detection and initial management of brain tumors from the proposer to the partners. This community service program aims to enhance the public's comprehensive understanding of the symptoms and initial management of brain tumors in the Banyuwangi region. Public awareness of brain tumors can encourage people to seek examination and treatment as early as possible.

Providing health education to the community is very important to increase knowledge. Knowledge has an effect on the behavior of the community in taking action. Behavior based on knowledge will be more effective than that of a community without knowledge. Indicators related to the health attitudes of the community are in line with their knowledge of a health problem (Sudayasa *et al.*, 2021). Based on the results obtained, there has been an increase in the community's knowledge about the symptoms and initial management of brain tumors in Banyuwangi Regency after participating in a series of community service activities. Providing knowledge to the community is expected to form the basis for their behavior in detecting brain tumors as early as possible in their surroundings and reducing delays in seeking treatment.

CONCLUSION

A notable increase in the public's awareness of brain tumors in Banyuwangi Regency has been observed, with a concomitant improvement in outcomes both prior to and following participation in a series of educational seminars. Seminar materials have been distributed to interested participants. Posters illustrating the common symptoms of brain tumors in adults and children have been installed in various health facilities throughout Banyuwangi Regency.

SUGGESTION

The continuation of this community service activity is contingent upon the enhancement of cross-sectoral cooperation to establish a brain tumor management system in Banyuwangi Regency. This community service activity has the potential to serve as a model for brain tumor education in other regions, given its efficacy in increasing public knowledge in a specific domain.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest to disclose.

DECLARATION OF ARTIFICIAL INTELLIGENCE (AI)

The authors affirm that no artificial intelligence (AI) tools, services, or technologies were employed in the creation, editing, or refinement of this manuscript. All content presented is the result of the independent intellectual efforts of the authors, ensuring originality and integrity.

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AUTHOR CONTRIBUTION

Author Rahadian Indarto Susilo, as the head of the community service activity, was responsible for coordinating the entire agenda of the community service team and compiling scientific articles. Author Irwan Barlian Immadoel Haq contributed to the preparation and delivery of seminar materials and scientific articles. Author Tedy Apriawan contributed to the preparation of seminar materials and the compilation of scientific articles. Author Joni Wahyuhadi's contributions included the creation of seminar materials and the compilation of scientific article outputs. Meanwhile, Author Septa Indra Puspikawati's contributions included the coordination of community development activities and the compilation of community service article outputs. Finally, Author Erica Medina Ramadhaningtyas's contributions included assisting the executive chairman in the compilation and implementation of community service activities and scientific article outputs.

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