



# Incidence, Histopathological Grade, and Type of Breast Cancer at Tarakan General Hospital, Jakarta, Indonesia in 2021

Silphia Novelyn <sup>a\*</sup> and Tiroy Sari B. Simanjuntak <sup>b</sup>

<sup>a</sup> Department of Anatomy, Faculty of Medicine, Universitas Kristen Indonesia, Jakarta, Indonesia.

<sup>b</sup> Department of Internal Medicine, Faculty of Medicine, Universitas Kristen Indonesia, Jakarta, Indonesia.

## Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

## Article Information

DOI: <https://doi.org/10.9734/ajrid/2025/v16i5441>

## Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://pr.sdiarticle5.com/review-history/134310>

**Original Research Article**

Received: 12/02/2025

Accepted: 15/04/2025

Published: 17/04/2025

## ABSTRACT

Breast cancer is a malignant tumor that arises from cells in the glands, glandular ducts, and supporting glands of the breast. Histopathological examination is needed to establish a definitive diagnosis, determine the type of breast cancer, assess the histopathological grade, and size of cancer that influences, and provide an overview of the management that can be done. This study aimed to describe the incidence of breast cancer based on the degree and histopathological classification at the Tarakan Regional General Hospital in 2021. This study uses medical record data with a retrospective study using the purposive sampling method. Based on the medical records of the Anatomic Pathology Laboratory at Tarakan Hospital, Jakarta, Indonesia in 2021, a

\*Corresponding author: E-mail: [silphia.novelyn@uki.ac.id](mailto:silphia.novelyn@uki.ac.id);

**Cite as:** Novelyn, Silphia, and Tiroy Sari B. Simanjuntak. 2025. "Incidence, Histopathological Grade, and Type of Breast Cancer at Tarakan General Hospital, Jakarta, Indonesia in 2021". *Asian Journal of Research in Infectious Diseases* 16 (5):1-8. <https://doi.org/10.9734/ajrid/2025/v16i5441>.

total of 36 patients were obtained who had undergone histopathological examination and met the inclusion criteria, namely the variables used were the degree and histopathological classification. The highest incidence of breast cancer based on age was in the 40-year age group with 27 cases (75.0%). All patients were female (100.0%). The most frequent histopathological degree was grade III, found in 18 cases (50.0%). The most common histopathological classification was invasive ductal carcinoma with 30 cases (83.3%). The most common age based on histopathological grade was 40 years old with 27 people (75.0%) with grade III with 14 people (38.9%). The most common age based on histopathological type was 40 years old with 27 cases (75.0%) with the most common histopathological type being invasive ductal carcinoma with 24 cases (66.7%).

*Keywords: Breast cancer; histopathological grade; histopathological classification.*

## 1. INTRODUCTION

The increasing prevalence of cancer and other chronic non-communicable diseases is seen throughout Indonesia. Cancer occurs when cells grow abnormally in one or more ways when cell division continues uncontrollably, and when the body's natural defenses fail to stop it. In Indonesia, breast cancer is one of the most common types of cancer affecting women (Alfiani D.,2022).

Breast cancer is a malignant tumor that arises in the glands, ducts, and supporting glands of the breast but does not spread to the surface. The prognosis of individuals with malignant breast tumors can be influenced by factors such as histopathological grade and tumor size, both of which can be determined through histopathological examination to establish a definitive diagnosis. To establish the diagnosis and to identify treatment targets, histopathological grading is essential (Hyperastuty AS, 2017). Grading is performed to provide more information on the histopathology report. Tumors require evaluation, which aims to describe all aspects of tumor cells and tissues that can be seen under a microscope because of their tendency to metastasize. Tumors are graded based on the number of mitoses, nuclear abnormalities, and the degree of differentiation of the tumor tissue (Yulestari PO, 2014). Breast cancer stage is first identified to determine the appropriate treatment and to determine the success of breast cancer treatment (Dewi GAT, 2015).

According to data from the Global Burden of Cancer (GLOBOCAN) issued by the World Health Organization (WHO), Asia makes the largest contribution to cancer incidence worldwide, recorded in 2020 the incidence of new cases was around 49.3% in Asia. In Asia, the incidence of breast cancer is 45.4% with a

high mortality rate. A total of 68,858 new cases of breast cancer were diagnosed in Indonesia in 2016 (The Global Cancer Observatory, 2020). The main cause of the development of cancer in the country is the lack of cancer screening programs, which effectively detect cancer before it becomes too advanced and provide treatment before cancer becomes too serious. There are several other problems with the current system, namely the lack of screening programs and the fact that people cannot easily get the care they need. Therefore, the public needs to learn how to detect breast cancer early through breast self-examination and get guidance on how best to manage the condition (Marfianti E, 2021).

Lack of education about breast cancer and the importance of early detection persists. Some believe that the only way to beat breast cancer is to have surgery right away, which is just one of many myths surrounding the disease. Reducing breast-related morbidity and mortality is essential to improving breast health and longevity (Marfianti E, 2021). The high incidence of breast cancer in Indonesia makes the author interested in looking at the incidence of breast cancer in Indonesia, especially at Tarakan Hospital, Hakarta, Indonesia. Based on the description in the background of the problem above, the problem formulation was obtained, namely, how is the picture of the incidence of breast cancer based on the degree and histopathological classification at the Tarakan Regional General Hospital in 2021.

## 2. MATERIALS AND METHODS

### 2.1 Research Design

This study's research design is retrospective and observational with data taken from actual medical records. Research with a descriptive focus seeks to describe or depict phenomena that have occurred in society. This study will

describe the incidence of breast cancer based on the degree and histopathological classification.

## **2.2 Research Location and Time**

The location of data collection for this research will be carried out at Tarakan Regional General Hospital, Central Jakarta, Indonesia. The research is conducted from June to December 2022.

## **2.3 Research Population and Sample**

This study used the Purposive Sampling method, namely sampling was carried out according to the required sample requirements that met the inclusion criteria and exclusion criteria with a sample size of 36 patient data.

## **2.4 Research Criteria**

### **2.4.1 Inclusion criteria**

Patients with a recorded diagnosis of breast cancer and who have complete archives and data on the results of Anatomical Pathology examinations in their medical records in the period from January to December 2021.

### **2.4.2 Exclusion criteria**

Patients with a diagnosis of non-breast cancer and who have incomplete archives and data on the results of Anatomical Pathology examinations in their medical records in the period from January to December 2021.

## **2.5 Research Instrument**

This study uses secondary data as a research instrument. Secondary data was obtained from the results of the medical records of the Anatomical Pathology Laboratory of Breast Cancer patients at the Tarakan Regional General Hospital in 2021.

## **2.6 Data Analysis**

Data analysis with univariate analysis test using SPSS. Univariate analysis will identify data sets in the form of frequencies and proportions of research variables and the results of the analysis are presented in the form of tables or graphs.

## **3. RESULTS AND DISCUSSION**

### **3.1 Univariate Analysis**

Based on the medical around 400 patient data were obtained who had undergone

histopathological examination and who met the inclusion criteria, including the variables used were histopathological grade and histopathological classification, 36 samples were obtained that met these variables. This is because the existing data does not all include the histopathological grade and classification in the Hospital's Electronic Health Record (EHR) application.

### **3.1.1 Breast cancer patients based on age**

The following is a table of the results of the percentage of breast malignant tumors by age at the Tarakan Regional General Hospital in 2021.

According to the data shown above, 18 patients (50.0%) diagnosed with breast cancer were mostly aged 40-49 years. While the second rank is 50-59 years old with 8 patients (22.2%), then 30-39 years old with 7 patients (19.4%), and the least is over 59 years old with 3 cases (8.3%). Age increases exposure to injury and mutations, and decreases immunity in the elderly, all of which increase the risk of cancer (Satya, I.G., 2018). Long-term exposure to estrogen is a risk factor that can contribute and other risk factors that take time to cause cancer. Breast cancer is quite rare before the age of 30, after which the risk increases significantly with age (Suarfi, A.S., 2019). Breast cancer usually attacks women five years before they reach menopause. The increasing rate of breast cancer in women over the age of 50 can be attributed to a weakening of the immune system and a decrease in body organs (Sulviana, E. R., & Sari, L. K. (2021). The aromatase enzyme is made by fat cells in the female breast, which causes local estrogen levels to increase with age. In postmenopausal women, the risk of breast cancer is increased due to locally produced estrogen (Mirsyad, A., et al, 2022).

Accumulation of toxins in breast fat tissue increases the risk of breast cancer in women over the age of 50. Women aged 40 years and over contribute 95% of new cases and 97% of deaths in breast cancer. While available data suggest that younger age at menarche may be associated with increased postmenopausal estrogen levels which will also increase the ability to develop breast cancer. This occurs because of mutational changes that occur with age. In Asia, cancer is diagnosed at an earlier age in low-income countries than in high-income countries, this is in line with increased screening services and increased knowledge and

awareness of the risks associated with breast cancer (Subiyanto, D, 2021).

**Table 1. Frequency distribution of breast cancer patients by age**

Age (year)	Frequency (n)	Percentage (%)
30-39	7	19,4
40-49	18	50,0
50-59	8	22,2
>59	3	8,3
Total	36	100,0

**3.1.2 Breast cancer tumor patients based on gender**

Based on the gender of malignant breast tumor patients at Tarakan Hospital in 2021, the following percentage results were obtained:

**Table 2. Frequency distribution of malignant breast tumor patients based on gender**

Gender	Frequency (n)	Percentage (%)
Male	0	0
Female	36	100.0
Total	36	100.0

The data in the table above shows that all 36 patients (100.0%) with malignant breast tumors were female (males were not found). The risk factor for the possibility of developing malignant breast tumors is gender, where women have the hormones progesterone and estrogen. Breast cancer is more likely to develop in women who have higher than normal estrogen levels. Based on these findings, only female patients have breast cancer. This is because breast cancer is a very common female disease. Some risk factors for male breast cancer include radiation exposure to the chest wall and chromosomal abnormalities such as Klinefelter syndrome (Suarfi AS.,2017).

**3.1.3 Breast cancer patients based on histopathology grade**

Based on the histology grade of breast cancer patients at Tarakan Hospital in 2021, the following percentage results were obtained) the method of breast cancer grading use Nottingham Grade System or Nottingham Grade System Modification Scarff-Bloom-Richardson).

**Table 3. Frequency distribution of breast cancer patients based on histopathology grade**

Histopathology Grade	Frequency (n)	Percentage (%)
Grade I	6	16.7
Grade II	12	33.3
Grade III	18	50.0
Total	36	100.0

Based on the table above, the histopathological grade of malignant breast tumors is the most common grade III with 18 people (50.0%), followed by grade II with 12 people (33.3%) and the last is grade I with 6 people (16.7%). Grade I can be called well-differentiated cells and is the lowest grade. In grade I, it has experienced a slight difference from normal cells, then develops slowly and experiences minimal cell division. Grade II or moderate grade can be described as a moderately differentiated grade. Cells in grade II are different from normal cells and grow slightly faster than usual. The highest grade is grade III which is also known as poorly differentiated cells. Grade III has cells that are very different from normal cells, their growth is rapid and unorganized, new and irregular cell division occurs (Suarfi AS.,2017).

Grading is based on how tumor cells behave compared to normal cells, which will allow one to estimate how fast cancer cells grow. The evaluation is based on a person's 10-year life expectancy, with grades I (85%), II (60%) and III (45%). A good prognosis is indicated by grade I, a moderate prognosis by grade II, and a poor prognosis by grade III. Patients with higher cancer grades tend to have tumors that are biologically more aggressive and invasive (Firdaus, V. R. P., 2016).

**3.1.4 Malignant breast tumor patients based on histopathological classification**

Based on the histopathological classification of malignant breast tumor patients at the Tarakan Regional General Hospital in 2021, the following results were obtained:

According to the data presented above, invasive ductal carcinoma was the most common histopathological type among 36 patients with malignant breast tumors (83.3%), followed by invasive lobular carcinoma two patients (5.6%), mucinous carcinoma two people (5.6%), medullary carcinoma one person (2.8%), and

adenocarcinoma one person (2.8%). As the name implies, invasive ductal carcinoma is a form of breast cancer that has penetrated the ductal wall and spread to the surrounding tissue. Invasive ductal carcinoma breast cancer is very complex and is caused by mutations in the BRCA1 and BRCA2 genes, closely related to exposure to the hormone estrogen. While the presence of estrogen and progesterone receptor abnormalities is a risk factor for malignant breast tumors of the invasive lobular carcinoma type, the HER2 gene is not mutated in this tumor (Suarfi AS.,2017). Approximately 15% of breast cancer cases are caused by mutations in the BRCA1 gene and 65% of cases are caused by mutations in the BRCA2 gene. Because of their role as tumor suppressors, BRCA1 and BRCA2 mutations can lead to uncontrolled cell proliferation if the proliferation signals is aberrant. HER2 promotes breast development, cell proliferation, and repair. Errors in the HER2 gene cause breast cells to proliferate rapidly. Anomalies in estrogen and progesterone receptors and loss of the E-Cadherin protein lead to invasive forms of lobular carcinoma, rather than changes in the underlying gene.

### 3.1.5 Age based on histological grade in malignant breast tumor patients

The age category based on histopathological grade in malignant tumor patients at Tarakan Hospital in 2021 is as follows:

Based on the table above, it can be seen that of the 36 patients with malignant breast tumors, the highest grade often affects those aged 40-49 years, namely 18 people (50.0%), while those aged 50-59 years were eight cases (22.2%), those aged 30-39 years were seven patients (19.4%), and finally those aged >59 years were three cases (8.3). Grade III is the most common at the age of 40-49 years as many as nine cases (25.0%), then in grade II at the age of 40-49 as many as six cases (16.7%), then there are four cases in grade II and III with the age of 50-59 years, then in grade I as many as three cases (8.3%) with the age of 40-49 years, I at the age of 30-39 years there are two cases (5.6%) and at the age of >59 years each grade there is one case (2.8%) and at the age of 30-39 years in grade II there is only one case. Various studies examining the correlation between age and histological grade of breast cancer have come to the same conclusion, there is no correlation between the two. However, it is important to highlight that individuals under the age of 40 and those over the age of 80 with breast cancer have a worse prognosis. According to Robin Kumar's pathology textbook, people with risk factors including a family history or genetic disease such as BRCA1 or BRCA2 are 20 years more likely to develop breast cancer than people without these conditions.<sup>19</sup> Malignant breast tumors that develop at a younger age tend to have a more aggressive phenotype, grade, and stage, and consequently a worse prognosis.

**Table 4. Frequency distribution of malignant breast tumor patients based on histopathological classification**

Histopathology Classification	Frequency (n)	Percentage (%)
Invasive Ductal Carcinoma	30	83.3
Invasive Lobular Carcinoma	2	5.6
Medullary Carcinoma	1	2.8
Adenocarcinoma	1	2.8
Mucinous Carcinoma	2	5.6
Total	36	100.0

**Table 5. Distribution of age based on histopathological grade in malignant breast tumor patients**

Age	Grade I		Grade II		Grade III		Total	
	n	%	n	%	n	%	n	%
30-39	2	5.6	1	2.8	4	11.1	7	19.4
40-49	3	8.3	6	16.7	9	25.0	18	50.0
50-59	0	0.0	4	11.1	4	11.1	8	22.2
>59	1	2.8	1	2.8	1	2.8	3	8.3
Total	6	16.7	12	33.3	18	50.0	36	100.0

### 3.1.6 Age based on histopathology type in malignant breast tumor patients

The results of age based on histopathology type in malignant breast tumor patients at Tarakan Hospital in 2021 are as follows:

Based on the data in the table above, it can be seen that of the 36 breast cancer patients who had biopsy results, breast cancer most often occurred at the age of 40-49 years as many as 18 people (50.0%) with the most histopathological type being invasive ductal carcinoma as many as 15 people (41.7%), then mucinous carcinoma two cases (5.6%), followed by invasive lobular carcinoma one case (2.8%). Furthermore, followed by the age of 50-59 years as many as 8 people (22.2%) with the most histopathological type being invasive ductal carcinoma with seven cases (19.4%) and invasive lobular carcinoma with one case (2.8%). Furthermore, at the age of 30-39 years, there were seven cases (19.4%) with invasive ductal carcinoma as the most cases six patients (16.7%), and medullary carcinoma one case (2.8%). Finally, with age >59 years as many as three cases with invasive ductal carcinoma two cases (5.8%), and adenocarcinoma one (2.8%). According to theory, the pathogenesis of breast cancer is very complex. The variety of different histopathological images of breast cancer is an external manifestation of hundreds of biological changes that occur in the lesion, and shows how complex and diverse the carcinogenesis pathway is. This pathogenesis is also related to mutations in tumor suppressor genes BRCA1, BRCA2, TP53, and CHEK2, breast cancer is divided into invasive carcinoma and non-invasive carcinoma histopathologically. Invasive ductal carcinoma accounts for about 70-80% of cases, while invasive lobular carcinoma is at 5-15%. In contrast to invasive lobular carcinoma which occurs more in young individuals, invasive ductal carcinoma often attacks women over the age of 50 years (Ningrum, M. P., & Rahayu, R. S. R. 2021).

The tendency of BRCA1 or BRCA2 gene mutations where mutations in one of these genes will produce different histopathological images that will affect the histopathological images of breast cancer at a young age. When the BRCA1 gene is mutated, breast cancer shows a different histopathological image from breast cancer with BRCA2 gene mutations. Mutations in the BRCA1 gene display a basal phenotype immunohistochemically so that tumor characteristics tend to have a high mitotic rate and are not well differentiated (grade III). This type of non-specific invasive ductal carcinoma is often found in both hereditary and sporadic cases. Histopathologically, someone with a BRCA2 gene mutation is still categorized into grades II and III and expresses positive estrogen receptors, which are often seen in tubular and lobular histopathology.

### 3.1.7 Gender based on histopathology type in malignant breast tumor patients

The gender based on histopathology type in malignant breast tumor patients at Tarakan Regional General Hospital in 2021 is as follows:

Based on the data in the table above, the type of breast cancer that most often attacks women. This was determined by analyzing biopsy images performed on 36 breast cancer patients. With 30 diagnoses (83.3%), invasive ductal carcinoma of the breast is the most common type of breast cancer in women. This is followed by invasive lobular carcinoma with two cases (5.6%), mucinous carcinoma with two cases (5.6%), medullary carcinoma with one case (2.8%), and adenocarcinoma with one case (2.8%). This is because women are more often exposed to the hormone estrogen during menstruation, pregnancy, and breastfeeding and this is also an important female hormone, but estrogen levels in men are not as high or even low compared to women. That is what causes men to rarely experience breast cancer.

**Table 6. Distribution of age based on histopathology type in malignant breast tumor patients**

Age	Invasive Ductal Carcinoma		Invasive Lobular Carcinoma		Medullary Carcinoma		Adenocarcinoma		Mucinous Carcinoma		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
30-39	6	16.7	0	0.0	1	2.8	0	0.0	0	0.0	7	19.4
40-49	15	41.7	1	2.8	0	0.0	0	0.0	2	5.6	18	50.0
50-59	7	19.4	1	2.8	0	0.0	0	0.0	0	0.0	8	22.2
>59	2	5.6	0	0.0	0.0	0.0	1	2.8	0	0.0	3	8.3
Total	30	83.3	2	5.6	1	2.8	1	2.8	2	5.6	36	100.0

**Table 7. Distribution of gender based on histopathology type in malignant breast tumor patients**

Histopathology Types	Male		Female		Total	
	n	%	n	%	n	%
Invasive Ductal Carcinoma	0	0	30	83.3	30	83.3
Invasive Lobular Carcinoma	0	0	2	5.6	2	5.6
Medullary Carcinoma	0	0	1	2.8	1	2.8
Adenocarcinoma	0	0	1	2.8	1	2.8
Mucinous Carcinoma	0	0	2	5.6	2	5.5
Total	0	0	36	100.0	36	100.0

#### 4. CONCLUSION

Based on the research that has been conducted as well as the objectives, results and discussions at Tarakan Hospital in 2021 regarding the description of the incidence of breast cancer based on the degree and histopathological classification with a total of 36 samples in patients, it can be concluded as follows: 1) The 40-49 year age group has the highest incidence of breast cancer, which is 18 cases (50.0%), 2) Of the 36 cases of breast cancer, all thirty-six (or 100%) were found in women, 3) The incidence of breast cancer based on histopathological degree was highest in grade III with 18 cases (50.0%), 4) Of the total 30 cases of breast cancer, invasive ductal carcinoma contributed the most (83.3%) based on histological classification, 5) The incidence of breast cancer distributed by age based on histopathological degree was highest in the age > 40 years, totaling 27 people (75.0%) with grade III as many as 14 people (38.9%), 6) The incidence of breast cancer distributed by age based on histopathology type, the most common is age >40 years as many as 27 cases (75.0%) with the most common histopathology type being invasive ductal carcinoma as many as 24 cases (66.7%), 7) The incidence of breast cancer is distributed by gender based on histopathology type, the most common occurs in women with the histopathology type being invasive ductal carcinoma as many as 30 cases (83.3%).

#### DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

#### ETHICAL APPROVAL

As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

#### ACKNOWLEDGEMENTS

Our deepest gratitude to Tarakan General Hospital, Central Jakarta, for facilitating the implementation of this research through patient data collection.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

#### REFERENCES

- Alfiani, D., Putri, M. P., & Widayanti, W. (2022). Literature study: Obesity as a risk factor in triple negative breast cancer. *Bandung Conference Series: Medical Sciences*, 2(1), 326–329.
- Dewi, G. A. T., & Hendrati, L. Y. (2015). Analysis of breast cancer risk based on history of hormonal contraceptive use and age. *Jurnal Berkala Epidemiologi*, 3(1), 12–23.
- Firdaus, V. R. P., Asri, A., Khambri, D., & Harahap, W. A. (2016). Relationship between histopathology grading and lymphovascular infiltration with molecular subtypes in invasive breast cancer in the Surgery Department of Dr. M. Djamil Padang Hospital. *Andalas Health Journal*, 5(1).
- Hyperastuty, A. S. (2017). Artificial neural network in determining histopathology grading of breast cancer. *Jurnal Biosains Sarjana*, 19(2), 177.
- Marfianti, E. (2021). Improving breast cancer knowledge and breast self-examination skills (SADARI) for early detection of breast cancer in Semutan Jatimulyo Dlingo. *Jurnal Abdimas Madani dan Lestari*, 3(1), 25–31.
- Mirsyad, A., Gani, A. B., Karim, M., Purnamasari, R., Karsa, N. S., & Tantra, A. H. (2022). The relationship between patient age and breast cancer stage at Ibnu Sina Hospital

- Makassar 2018. *Fakumi Medical Journal: Journal of Medical Students*, 2(2), 109–115.
- Ningrum, M. P., & Rahayu, R. S. R. (2021). Determinants of breast cancer incidence in women of childbearing age (15–49 years). *Indonesian Journal of Public Health and Nutrition*, 1(3), 362–370.
- Satya, I. G. M. S. W., Niryana, I. W., Tusta, P. A. T. A. A., & Dewi, N. P. A. P. A. (2018). Description of the stage and histopathology type of breast cancer in the Surgical Oncology Sub-Division of Sanglah General Hospital, Denpasar in 2015–2016. *Medical Science Digest*, 9(1).
- Suarfi, A. S., Anggraini, D., & Nurwiyeni, N. (2019). Histopathology description of malignant breast tumors in the Anatomical Pathology Laboratory of M. Djamil General Hospital, Padang in 2017. *Health and Medical Journal*, 1(1), 7–14.
- Subiyanto, D., Kadi, T. A., Ismayiah, I., Abdurrahman, N., Utomo, Y. P., Alifiansyah, A. R., & Fidianingsih, I. (2021). Molecular subtypes of breast cancer in Madiun Regional Hospital and their relationship with histopathology grading. *Health Research and Development Media*, 31(3), 193–202.
- Sulviana, E. R., & Sari, L. K. (2021). The relationship between age, education, and occupation with the incidence of breast cancer in women in East Kalimantan. *Borneo Studies and Research*, 2(3), 1937–1943.
- The Global Cancer Observatory. (2020). *Cancer incident in Indonesia*. International Agency for Research on Cancer. <https://gco.iarc.fr/today/data/factsheets/populations/360-indonesia-fact-sheets.pdf>
- Yulestari, P. O., Berata, I. K., & Suparkartika, I. K. E. (2014). Histopathological study of mammary gland tumors in dogs in Denpasar based on age and breed. *Indonesia Medicus Veterinus*, 3(3), 176–182.

**Disclaimer/Publisher's Note:** The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of the publisher and/or the editor(s). This publisher and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.

© Copyright (2025): Author(s). The licensee is the journal publisher. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:  
The peer review history for this paper can be accessed here:  
<https://pr.sdiarticle5.com/review-history/134310>