JOURNAL LA MEDIHEALTICO

VOL. 06, ISSUE 05 (1391-1400), 2025
DOI: 10.37899/journallamedihealtico.v6i5.2724

Analysis of Prostate Cancer Incidence Based on Body Mass Index and Blood Pressure Factors

Sabna Ayu Sagita Berliana[1], Yuni Prastyo Kurniati[2]

[1]Faculty of Medicine, Universitas Muhammadiyah Surakarta, Indonesia
[2]Centre for Cancer Studies, Faculty of Medicine, Universitas Muhammadiyah Surakarta, Surakarta, Indonesia

**Corresponding Author: Yuni Prastyo Kurniati*
Email: ypk134@ums.ac.id

Article Info

Article history:
Received 24 October 2025
Received in revised form 12 November 2025
Accepted 30 November 2025

Keywords:
Body Mass Index
Blood Pressure
Obesity
Prostate Cancer
Risk Factors

Abstract

Prostate cancer is one of the most common cancers in men worldwide and ranks fourth according to GLOBOCAN 2022. Its incidence in Asia, including Indonesia, continues to increase each year. Prostate cancer risk factors include both modifiable variables like blood pressure and body mass index (BMI) and non-modifiable variables like age and family history. This study aimed to determine the association between BMI and blood pressure with the incidence of prostate cancer. This study employed an analytical observational design using a retrospective hospital-based case-control approach. A total of 68 samples were collected, comprising 22 patients with benign prostatic hyperplasia (BPH) as the control group and 46 patients with prostate cancer as the case group. BMI and blood pressure data were collected from medical records and categorized based on the classifications from the WHO and PERHI (2019). The chi-square test was employed for the bivariate analysis with a significance level of $p < 0.05$. There was no significant associationfound between blood pressure and the incidence of prostate cancer ($p = 0.304$), while there was a significant association between BMI and the risk of prostate cancer ($p = 0.023$). The OR value of 0.581 with a 95% CI (0.205–1.645) indicated that blood pressure was not a statistically significant factor. These findings imply that hormonal alterations, persistent inflammation, and elevated insulin-like growth factor 1 (IGF-1) activity may raise the risk of prostate cancer in overweight individuals. In conclusion, BMI shows a significant association with prostate cancer incidence, whereas blood pressure does not demonstrate a significant association.

Introduction

One of the most common malignant tumors in men diagnosed globally is prostate cancer (Bergengren et al., 2023; Barsouk et al., 2020; Daniyal et al., 2014). Based on the Global Cancer Statistics (GLOBOCAN, 2022), Around 7.3% of all cancer cases are prostate cancer, making it the fourth most frequent type of cancer globally (Bray et al., 2024; Bray et al., 2024; Mohamed et al., 2025). Its incidence across Asian countries continues to increase. In 2012, the World Health Organization (WHO) reported prostate cancer incidence rates of 10.5% in East Asia and 4.5% in South-Central Asia (Chen et al., 2015; Nawi et al., 2023; Manorom, 2025). Over the course of eight years, 1,102 instances of prostate cancer were recorded in three tertiary referral hospitals in Indonesia (Jakarta, Surabaya, and Bandung). The average patient age was 67 years, and 59.3% of patients received an advanced diagnosis (Yang et al., 2025; Yamashita

ISSN 2721-1215 (Print), ISSN 2721-1231 (Online)

et al., 2025; Charpentier et al., 2024). At Dr. Moewardi General Hospital, Surakarta, 30 cases were recorded between 2000 and 2006, comprising 23 localized and 7 metastatic cases (Ministry of Health, Republic of Indonesia, 2018). Meanwhile, at PKU Muhammadiyah Hospital Surakarta, 124 prostate cancer cases were reported between 2018 and 2023 out of a total of 177 prostate-related cases, with the majority of patients aged over 65 years (66.1%) (Nabilah and Kurniati, 2024).

The risk factors contributing to prostate cancer can be classified into two main groups: non-modifiable and modifiable (Reyes et al., 2025; Bossio et al., 2024; Barna et al., 2025). Non-modifiable factors consist of advanced age, race, and family history, while modifiable factors include physical activity, sleep quality, nutritional intake, medical and surgical history, smoking behavior, as well as environmental or occupational exposure (Bergengren et al., 2023; Ramadan et al., 2025; Glans et al., 2024).

The risk and prognosis of prostate cancer are thought to be association with the body mass index (BMI) (Ramadani et al., 2024; Fritz et al., 2024; Barone et al., 2025). A meta-analysis by Tzenios et al. (2022) revealed that obesity (BMI ≥30 kg/m²) significantly elevates the risk of prostate cancer ($p < 0.001$). Similarly, Ramadani et al. (2024) reported that individuals with a BMI >25 kg/m² have a 1.07-fold higher risk of developing prostate cancer ($p < 0.0001$). Conversely, a study carried out at Dr. Hasan Sadikin General Hospital, Bandung, reported no significant association between BMI and prostate cancer severity when assessed using Gleason scores (Abdurrahman et al., 2018). The PROCA-Life prospective study by Stikbakke et al. (2022) involving 12,271 men in Norway revealed that systolic blood pressure ≥150 mmHg increased prostate cancer risk by 35% ($p = 0.025$). In addition, diastolic blood pressure ≥100 mmHg in patients receiving curative therapy was associated with a threefold higher risk of mortality ($p = 0.004$), supporting a significant association between hypertension and prostate cancer. Similarly, Chima et al. (2024) reported that both systolic ($p < 0.018$) and diastolic ($p < 0.022$) blood pressure were significantly associated with prostate cancer incidence.

Methods

Research Design

The case group in this study was prostate cancer, and the control group was benign prostatic hyperplasia (BPH). The study employed an analytical observational design using a retrospective, hospital-based case-control strategy. The selection of BPH as the control group was based on practical and pathological considerations. Given that the gold standard for diagnosing prostate cancer is histological investigation, obtaining prostate tissue samples from healthy men is not feasible. Therefore, both the case and control groups were selected from conditions commonly diagnosed through prostate biopsy and documented in the anatomical pathology laboratory, namely prostate cancer as a malignant condition and BPH as a benign prostate disorder.

Population and Sample

The study population comprised all medical records of histopathological specimens of the prostate organ recorded at the Anatomical Pathology Laboratory of PKU Muhammadiyah Hospital Surakarta during the period 2018–2023, with final diagnoses of prostate cancer serving as the case group and benign prostatic hyperplasia (BPH) as the control group. Sampling in this study was conducted using consecutive sampling, a technique in which all eligible subjects within a defined time period who meet the inclusion criteria are included sequentially without subjective selection by the researchers. This method was employed to minimize potential selection bias in medical record-based studies. A total of 68 samples were obtained, consisting of 46 prostate cancer cases and 22 BPH controls.

Criteria and Parameters

Inclusion criteria were, histopathological confirmation of prostate cancer (cases) or BPH (controls), patient age ≥70 years, and complete medical record documentation of key variables, including BMI and blood pressure. Exclusion criteria included, histopathological evidence of malignancies metastasizing to the prostate, incomplete medical records lacking required variables, and prior history of prostate diseases other than prostate cancer or BPH, such as prostatitis.

The Indonesian Ministry of Health's 2019 guidelines for BMI classification were as follows: normal (18.5–25 kg/m²), overweight (25–30 kg/m²), and obese (>30 kg/m²). The Indonesian Hypertension Association's 2019 criteria were used to classify blood pressure: normal (SBP 120–129 mmHg; DBP 80–84 mmHg) and hypertension (SBP ≥140 mmHg and/or DBP ≥90 mmHg).

Data Analysis

Univariate analysis was used to describe the features of the patients. The chi-square test and bivariate analysis were used to examine the association between blood pressure, BMI, and the incidence of prostate cancer. The significance level was set at $p < 0.05$. The results were displayed using frequency and percentage distributions, odds ratios (ORs), and 95% confidence intervals (CIs) for pertinent variables.

Ethical Clearance

Ethical clearance for this study was obtained from the Health Research Ethics Committee of PKU Muhammadiyah Hospital Surakarta (No. 08/KEPK/RS.PKU/IX/2025). All procedures adhered to ethical principles for research involving human data.

Results and Discussion

The study samples where the research sample was obtained from medical records over a five-year period, from 2018 to 2023. The samples came from histopathological specimens with a final diagnosis of prostate cancer and BPH at the Anatomical Pathology Laboratory of PKU Muhammadiyah Hospital Surakarta. Based on medical records, 68 samples were obtained, consisting of 46 cases of prostate cancer (PCa) and 22 cases of benign prostatic hyperplasia (BPH). The characteristics of the research respondents are presented in the following table.

Univariate Analysis

Table 1. Characteristics of Prostate Cancer Respondents

Variable	Frequency	Percentage (%)
Age		
At risk (>70 years)	**46**	**100**
Residence		
Urban	**40**	**87.0**
Rural	6	13.0
Body Mass Index (BMI)		
Normal	15	32,6
Overweight	**17**	**37,0**
Obese	14	23.9
Blood Pressure		
Non-Hypertensive	**31**	**67.4**
Hypertensive	15	32.6

Source: Primary Data, 2025

Based on Table 1, all respondents were in the high-risk age category (>70 years), with a percentage of 100%. Regarding residence, the majority of respondents lived in urban areas, totaling 40 respondents (87.0%). Most respondents had a overweight BMI status, totaling 17 respondents (37.0%). Meanwhile, for blood pressure, the majority of respondents were classified as non-hypertensive, totaling 31 respondents (67.4%).

Table 2. Characteristics of Benign Prostatic Hyperplasia (BPH) Respondents

Variable	Frequency	Percentage (%)
Age		
At risk (>70 years)	22	100
Residence		
Urban	16	72.7
Rural	6	27.3
Body Mass Index (BMI)		
Normal	14	63,6
Overweight	2	9,1
Obese	6	27,3
Blood Pressure		
Non-Hypertensive	12	54.5
Hypertensive	10	45.5

Source: Primary Data, 2025

Based on Table 2, all respondents were in the high-risk age category (>70 years), accounting for 100%. Regarding residential, the majority of respondents lived in urban areas, totaling 16 respondents (72.7%). Most respondents had a normal BMI status with 14 respondents (63.9%). Meanwhile, for the blood pressure variable, the majority of respondents were classified as non-hypertensive, comprising 12 individuals (54.5%).

Bivariate Analysis

Table 3. Association Among Body Mass Index with Prostate Cancer Incidence

Body Mass Index Categories	Prostate Cancer		BPH		Total	
	F	%	F	%	F	%
Normal	15	22.1	14	20.6	29	42.6
Overweight	17	25.0	2	2.9	19	27.9
Obese	14	20.6	6	8.8	20	29.4
Total	46	67.6	22	32.4	68	100

Source: Primary Data, 2025

The bivariate analysis of the association between body mass index (BMI) and the incidence of prostate cancer produced a p-value of 0.023. This implies that the incidence of prostate cancer and BMI are significantly associated. The majority of respondents in the prostate cancer group were in the overweight BMI category (25.0%), while those in the BPH group were in the normal BMI category (20.6%). This shows that the distribution of BMI between the two groups is significantly different, with the overweight category contributing the most to this difference.

Table 4. Association Among Blood Pressure and Prostate Cancer Incidence

Blood Pressure Categories	Prostat Cancer		BPH		Total		p-value	OR (95% CI)
	F	%	F	%	F	%		
Hypertensive	15	32.6	10	45.5	25	36.8		
Non-Hypertensive	31	67.4	12	54.5	43	63.2	0.304	0.581 (0.205-1.645)
Total	46	100	22	100	22			

Source: Primary Data, 2025

The results of the bivariate analysis of the association between blood pressure factors and the incidence of prostate cancer showed a p-value of 0.304. This indicates no significant association between blood pressure and the incidence of prostate cancer. The table shows that in both groups, prostate cancer (67.4%) and BPH (54.5%), the majority of respondents were in the non-hypertensive category. An OR value of 0.581 indicates that hypertension does not increase the likelihood of prostate cancer.

Association of Body Mass Index with Prostate Cancer Incidence

Table 3 indicates a substantial association between body mass index (BMI) and the incidence of prostate cancer, with a chi-square p-value of 0.023. The BMI categories in this study were divided into three groups, namely normal, overweight, and obese. The study sample demonstrated that most respondents in the prostate cancer group were categorized as overweight, whereas those in the BPH group were predominantly in the normal BMI category. These findings are consistent with a meta-analysis by Ramadani et al. (2024), which reported that overweight status is significantly associated with an increased risk of prostate cancer, with an RR of 1.08 after sensitivity analysis. This indicates that men with overweight BMI have approximately an 8% higher risk of developing prostate cancer compared to men with normal BMI (Ramadani et al., 2024). However, this study differs from the meta-analysis by Tzenios et al. (2022), which analyzed data from the United States, Sweden, the United Kingdom, Germany, South Korea, Denmark, Italy, Australia, the Netherlands, and Norway. According to their findings, obesity is substantially linked to an increased risk of prostate cancer. Overweight men were 54% more at risk than men of normal weight, according to a review of 23 research (Tzenios et al., 2022). In a study carried out in northern Tanzania, Ngowi et al. (2025) revealed similar findings, finding a substantial association between BMI and prostate cancer. Their analytical observational study revealed that most respondents had obese nutritional status (Ngowi et al., 2025). However, a study by Abdurrahman et al. (2018) found no evidence of a significant relationship between BMI and Gleason score in individuals with prostate cancer. This study, conducted at Dr. Hasan Sadikin General Hospital, Bandung, using a retrospective cross-sectional design, suggested that BMI did not influence tumor aggressiveness based on Gleason grading (Abdurrahman et al., 2018).

The underlying pathophysiological mechanisms indicate that increased BMI whether in the overweight or obese categories may contribute to prostate cancer risk through inflammatory, metabolic, and hormonal dysregulation. The accumulation of visceral adipose tissue promotes the secretion of proinflammatory cytokines (TNF-α, IL-6) and adipokines, which induce chronic inflammation, insulin resistance, and increased IGF-1 levels. These factors collectively stimulate proliferation and inhibit apoptosis of prostate cells (Parikesit et al., 2016). Additionally, increased adipose mass is associated with reduced adiponectin levels, which further enhances the mitogenic effects of IGF-1 and facilitates tumor progression (Ramadani et al., 2024). Furthermore, decreased sex hormone–binding globulin (SHBG) in individuals

with high BMI increases free testosterone availability, while aromatase activity in adipose tissue enhances the conversion of androgens to estrogens. This hormonal imbalance may trigger abnormal prostate cell proliferation (Parikesit et al., 2016). In obesity, these alterations become more pronounced, including elevated leptin and reduced adiponectin levels, potentially promoting the transition of prostate cells toward androgen independence (Tzenios et al., 2022). This mechanism aligns with the broader literature indicating that obesity is not only associated with metabolic disorders but also acts as a risk factor for various malignancies, including prostate cancer, primarily through chronic inflammation and metabolic dysfunction (Romadhon & Kurniati, 2024). Overall, these findings indicate that increased BMI plays an important role as a risk factor influencing prostate carcinogenesis through chronic inflammation, hormonal imbalance, and metabolic dysregulation.

Association of Blood Pressure with Prostate Cancer Incidence

According to Table 4, the research revealed a non-significant association between blood pressure and the incidence of prostate cancer, with a chi-square p-value of 0.304. The OR was 0.581, suggesting that hypertension does not increase the likehood of developing prostate cancer. Furthermore, the 95% CI (0.205-1.645), which crosses the value of 1, reinforces that the results is not statistically significant. Both the prostate cancer and BPH groups were predominantly categorized as non-hypertensive. These results are in agreement with the study by Perez-Cornago et al. (2017) conducted using data from the UK Biobank population, which also reported not significantly associated between hypertension and prostate cancer. That study applied a prospective cohort design (Perez-Cornago et al., 2017). However, this contrasts with the prospective cohort study PROCA-life in Tromsø, Norway, where prostate cancer patients with diastolic blood pressure ≥100 mmHg had a threefold increase in overall mortality risk, indicating a significant association between blood pressure and prostate cancer (Stikbakke et al., 2022). Another finding indicates that the study by Chima et al. (2024), conducted at a tertiary hospital in South West Nigeria, reported a significant increase in both systolic and diastolic blood pressure among the case group which included patients with hypertension, prostate cancer, or both compared to the control group. Their results further emphasize that hypertension is significantly associated with an increased predisposition to the development of prostate cancer (Chima et al., 2024).

Vascular endothelial growth factor (VEGF), a key facilitator of angiogenesis that provides the prostate tumor with oxygen and nutrients, is thought to have a role in the pathophysiological pathways connecting hypertension and prostate cancer. Increased VEGF expression has been shown to supports tumor proliferation and progression through vascular stimulating, while also acting as a vasodilator by increasing nitric oxide (NO) production to maintain vascular tone. VEGF signaling pathway inhibitors (VSPIs) are used as cancer therapies to inhibit angiogenesis; however, they also reduce NO bioavailability, leading to vasoconstriction, increased endothelin-1, and reactive oxygen species (ROS), causing oxidative stress, endothelial damage, and DNA damage in prostate epithelial cells, which activates oncogenic pathways such as RAS. VEGF inhibition can also results in microvascular rarefaction and nephrotoxicity, increasing systemic vascular resistance as well as sodium and fluid retention, thereby contributing to hypertension. Hypertension further accelerates carcinogenesis through activation of the renin-angiotensin-aldosterone system, increasing oxidative stress and inflammation (Cohen et al., 2023), disrupting calcium homeostasis that promoting lipogenesis and lipid oxidation (Chima et al., 2024), and sympathetic nervous system activation, which enhances catecholamine release and beta-adrenergic receptors activation in prostate cancer cells, thereby proliferation and increasing tumor invasiveness (Kazmi et al., 2023). The differences observed in this study may be influenced by the characteristics of the respondents. Based on table 1, most patients with prostate cancer were older than 70 years, had an overweight BMI category, and predominantly resided in urban areas. These characteristics are

factors commonly associated with an increased risk of hypertension. The homogeneity of these characteristics across both group may have reduced the variability in blood pressure, thereby resulting is the non-significant association between hypertension and prostate cancer in this study.

Conclusion

The research findings have shown that there is a statistically significant relationship between BMI and the occurrence of prostate cancer, indicating that overweight and obesity might be having a leading role in biological mechanisms, which increase the risk of developing prostate cancer. These data are congruent with the existing data that adiposity is associated with hormonal changes, low-grade chronic inflammation, and metabolism dysregulation, which can all play a role in carcinogenesis. On the other hand, there was no significant correlation between blood pressure and prostate cancer incidence suggesting that hypertension may not be a direct predictor of risk of prostate cancer or its possible effects may be obscured by other unmeasured or confounding factors.

However, the connection between prostate cancer and obesity is complex as it depends on the interaction of various metabolic and life patterns. Further studies, therefore, are required to include a larger number of indicators of obesity, including lipid profiles (including total cholesterol, LDL, HDL, triglycerides), as such biomarkers are often related to inflammatory and metabolic conditions that are relevant to carcinogenesis. Dietary habits are also a decisive factor, since dietary intake, especially the intake of saturated fats, source of antioxidants, and consumption of processed foods may regulate prostate cancer risks through various bioactive mechanisms. It is the combination of dietary data that would allow the investigators to determine whether the effect of BMI on prostate cancer is mediated or moderated by nutritional quality.

Further analysis of the said other variables would not only enhance predictive models, but also provide better understanding of evidence-based preventive strategies. In turn, a more comprehensive method of future investigation is highly recommended in order to explain possible causal routes and to make more specific recommendations to the population-health.

Suggestion

The results of the study, both red ginger and lemongrass foot baths have been proven effective in lowering blood pressure in pregnant women with mild hypertension. Therefore, midwives can make this therapy a routine complementary intervention in ANC services, especially for pregnant women with hypertension that is still in the mild category. Midwives are expected to provide practical education on how to perform red ginger and lemongrass foot baths at home, so that pregnant women can continue the therapy independently and safely. The results of this study indicate that the use of local herbs such as red ginger and lemongrass can be used as an alternative non-pharmacological therapy that is cheap, easy, and safe, therefore, health institutions are advised to integrate this therapy into maternal health service programs, for example through pregnancy classes or integrated health post activities. Given the results of the study prove that red ginger and lemongrass foot baths lower blood pressure, pregnant women with mild hypertension are advised to carry out this therapy regularly according to the instructions of health workers and families are expected to play an active role in helping to prepare materials and support pregnant women in carrying out this therapy at home for more optimal results. Recommendations for further research include developing a larger sample size to ensure more representative results and conducting a longer timeframe to assess the long-term effects of the intervention. Further research should also directly monitor the level of medication adherence, which can impact blood pressure measurement results in respondents, to achieve optimal results.

Acknowledgment

The authors would like to thank the medical staff and employees who helped in this study, as well as the Laboratory of Anatomical Pathology at PKU Muhammadiyah Surakarta Hospital for their cooperation and support. We also thank the Laboratory of Anatomical Pathology at Universitas Muhammadiyah Surakarta's Faculty of Medicine for its assistance and research resources.

References

Abdurrahman, F., Suryanti, S., & Sihombing, A.T., (2018). The Relationship between Body Mass Index (BMI) and Gleason Score of Indonesian Prostate Cancer Men in Hasan Sadikin General Hospital Hubungan Body Mass Index (BMI) dan Gleason Score pada Penderita Keganasan Prostat di Rumah Sakit Umum Hasan Sadikin, Research Article 780 Journal of Medicine and Health

Ali, A., Kulik, G., (2021). Signaling pathways that control apoptosis in prostate cancer. Cancers Basel 13, 1–35. https://doi.org/10.3390/cancers13050937

Bambang, D.A., Jarkawi, S., Primadewi, K., Habibah, U., Lounggina, T., Peny, L., Pratama, K., Derry, R., Wiena, N., Abdul, S., Zulfiah, W., Bambang, L., Firdaus, S., & Dharta, Y. (2022). Metode Penelitian Kuantitatif.

Barna, R., Dema, A., Jurescu, A., Văduva, A. O., Lăzureanu, D. C., Vița, O., ... & Dema, S. (2025). The Relevance of Sex and Age as Non-Modifiable Risk Factors in Relation to Clinical-Pathological Parameters in Colorectal Cancer. Life, 15(2), 156. https://doi.org/10.3390/life15020156

Barone, B., Amicuzi, U., Massanova, M., Napolitano, L., Reccia, P., Mirto, B. F., ... & Crocetto, F. (2025). The correlation between body mass index and prostate volume: a retrospective analysis of pre and postoperative measurements in prostate cancer patients. The Prostate, 85(5), 433-442. https://doi.org/10.1002/pros.24845

Barsouk, A., Padala, S. A., Vakiti, A., Mohammed, A., Saginala, K., Thandra, K. C., ... & Barsouk, A. (2020). Epidemiology, staging and management of prostate cancer. Medical Sciences, 8(3), 28. https://doi.org/10.3390/medsci8030028

Bergengren, O., Pekala, K.R., Matsoukas, K., Fainberg, J., Mungovan, S.F., Bratt, O., Bray, F., Brawley, O., Luckenbaugh, A.N., Mucci, L., Morgan, T.M., &Carlsson, S. V. (2023). 2022 Update on Prostate Cancer Epidemiology and Risk Factors— A Systematic Review. Europena of Urology. https://doi.org/10.1016/j.eururo.2023.04.021

Bossio, S., Urlandini, L., Perri, A., Conforti, F., Aversa, A., Di Agostino, S., & Rago, V. (2024). Prostate cancer: emerging modifiable risk factors and therapeutic strategies in the management of advanced cancer. Life, 14(9), 1094. https://doi.org/10.3390/life14091094

Bray, F., Laversanne, M., Ferlay, J., Siegel, R. L., Soerjomataram, I., & Jemal, A. (2024). Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin 74, 229–263. https://doi.org/10.3322/CAAC.21834

Bray, F., Laversanne, M., Sung, H., Ferlay, J., Siegel, R. L., Soerjomataram, I., & Jemal, A. (2024). Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: a cancer journal for clinicians*, *74*(3), 229-263. https://doi.org/10.3322/caac.21834

Centers for Disease Control and Prevention. (2023). URL https://www.cdc.gov/bmi/adult-calculator/bmi-categories.html

Charpentier, M., Goupille, C., Arbion, F., Avigdor, S., Michenet, P., Body, G., & Ouldamer, L. (2025). Male Breast Cancer: Insights from a Two-Center Epidemiological Analysis. Journal of Gynecology Obstetrics and Human Reproduction, 103057. https://doi.org/10.1016/j.jogoh.2025.103057

Chen, R., Ren, S., Yiu, M.K., Fai, N.C., Cheng, W.S., Ian, L.H., Naito, S., Matsuda, T., Kehinde, E., Kural, A., et al, (2015). Prostate cancer in Asia: A collaborative report. Asian Journalof Urology 15 https://doi.org/10.1016/J.AJUR.2014.08.007

Chima, S.A., Samuel, O.A., Fisayo, A.M., & Ibukunoluwa, A.E. (2024). Assessment of the Relationship between High Blood Pressure and the Risk of Prostate Cancer among Patients in South-West, Nigeria. Journal of Radiation Medicine in the Tropics 5, 21–27. https://doi.org/10.4103/JRMT.JRMT_5_21

Cohen, J.B., Brown, N.J., Brown, S.A., Dent, S., Van Dorst, D.C.H., Herrmann, S.M., Lang, N.N., Oudit, G.Y., & Touyz, R.M. (2023). Cancer Therapy-Related Hypertension: A Scientific Statement from the American Heart Association. Hypertension, 81(4), https://doi.org/10.1161/HYP.0000000000000224

Daniyal, M., Siddiqui, Z. A., Akram, M., Asif, H. M., Sultana, S., & Khan, A. (2014). Epidemiology, etiology, diagnosis and treatment of prostate cancer. Asian Pacific Journal of Cancer Prevention, 15(22), 9575-9578.

Fritz, J., Jochems, S. H., Bjørge, T., Wood, A. M., Häggström, C., Ulmer, H., ... & Stocks, T. (2024). Body mass index, triglyceride-glucose index, and prostate cancer death: a mediation analysis in eight European cohorts. British Journal of Cancer, 130(2), 308-316. https://doi.org/10.1038/s41416-023-02526-1

Glans, I., Nägga, K., Gustavsson, A. M., Stomrud, E., Nilsson, P. M., Melander, O., ... & Palmqvist, S. (2024). Associations of modifiable and non-modifiable risk factors with cognitive functions–a prospective, population-based, 17 years follow-up study of 3,229 individuals. Alzheimer's Research & Therapy, 16(1), 135. https://doi.org/10.1186/s13195-024-01497-6

Hasan, A., Linkon, M., Labib, T., Hasan, M., & Hossain, M.-E.-J., (2021). Deep learning in prostate cancer diagnosis and Gleason grading in histopathology images: An extensive study. Informatics in Medicine Unlocked, 24, 100582. https://doi.org/10.1016/j.imu.2021.100582

Manorom, D. (2025). Trends and projections in prostate cancer epidemiology in Thailand: A population-based cancer registry analysis. Asian Journal of Urology. https://doi.org/10.1016/j.ajur.2025.03.005

Mohamed, K., Abarikwu, S. O., Mmema, L., Jibril, A. T., Rahmah, L., Ivanovska, M., ... & Boccalatte, L. A. (2025). A Global Perspective of Cancer Prevalence: 14. Cancer and Surrounding Environment: Etiologies and Tumor Microenvironment, 305, 303.

Murray, T.B.J., & Murray, T. (2021). The Pathogenesis of Prostate Cancer. Exon Publication https://doi.org/10.36255/exonpublications.prostatecancer.2021

Mustafa, M., Salih, A.F., Illzam, E.M., Sharifa, A.M., Suleiman, M., & Hussain, S.S. (2016). Prostate Cancer: Pathophysiology, Diagnosis, and Prognosis. IOSR Journal of Dental and Medical Sciences e-ISSN 15, 4–11. https://doi.org/10.9790/0853- 1506020411

Nabilah, A., & Kurniati, Y.P. (2024). Risk Factor Analysis of Residential Topography and Age on Prostate Cancer Incidence. Journal of Agromedicine and Medical Sciences. 2024 10, 149. https://doi.org/10.19184/ams.v10i3.52261

Nawi, A. M., Masdor, N. A., Othman, R., Kandayah, T., Ahmad, N., & Safian, N. (2023). Survival rate and prognostic factors of localised prostate cancer in Southeast Asian countries: a systematic review with meta-analysis. Asian Pacific Journal of Cancer Prevention: APJCP, 24(9), 2941. https://doi.org/10.31557/APJCP.2023.24.9.2941

Parikesit, D., Mochtar, C.A., Umbas, R., & Hamid, A.R.A.H. (2016). The impact of obesity towards prostate diseases. Prostate International. https://doi.org/10.1016/j.prnil.2015.08.001

Perdana, N.R., Mochtar, C.A., Umbas, R., Rizal, A., & Hamid, A.H. (2016). The Risk Factors of Prostate Cancer and Its Prevention: A Literature Review The risk factors of prostate cancer and its prevention.

Ramadan, H. K., Fouad, A. I., ElKotb, Z. G., & Abo Elmaaty, O. H. (2025). Modifiable and Non-Modifiable Risk Factors Affecting Oral Health in Older People. Tanta Scientific Nursing Journal, 36(1).

Ramadani, F. G., Perdana, N. R., & Ringoringo, D. R. L. (2024). Body mass index, obesity and risk of prostate cancer: A systematic review and meta-analysis. Central European journal of urology, 77(2), 176. https://doi.org/10.5173/ceju.2023.162

Ramadani, F.G., Perdana, N.R., & Ringoringo, D.R.L. (2024). Body mass index, obesity and risk of prostate cancer: a systematic review and meta-analysis. Central European Journal of Urology 77, 176. https://doi.org/10.5173/CEJU.2023.162

Reyes-Chacon, M. T., Lopez-Arellanes, L. R., & Leiner, M. (2025). Integrating Knowledge of Modifiable and Non-modifiable Risk Factors: A Comprehensive Framework for Breast Cancer Prevention Practices in Women. Journal of Cancer Education, 1-9. https://doi.org/10.1007/s13187-025-02667-2

Romadhon, Y. A., & Kurniati, Y. P., (2024). Pathway Pengaruh Lingkungan dalam Inisiasi dan Progresivitas Kanker Tulang dan Jaringan Lunak. Muhammadiyah University Press.

Siegel, R.L., Miller, K.D., Fuchs, H.E., & Jemal, A. (2022). Cancer statistics, 2022. CA: A Cancer Journal for Clinicians, 72, 7–33. https://doi.org/10.3322/CAAC.21708

Stikbakke, E., Schirmer, H., Knutsen, T., Støyten, M., Wilsgaard, T., Giovannucci, E.L., McTiernan, A., Eggen, A.E., Haugnes, H.S., Richardsen, E., & Thune, I. (2022). Systolic and diastolic blood pressure, prostate cancer risk, treatment, and survival. The PROCA-life study. Cancer Medicine 11, 1005–1015. https://doi.org/10.1002/CAM4.4523

Tzenios, N., Tazanios, M.E., & Chahine, M. (2022). The impact of body mass index on prostate cancer: An updated systematic review and meta-analysis. Medicine (United States) 101, E30191. https://doi.org/10.1097/MD.0000000000030191

Yamashita, K., Oka, S., Yamada, T., Mitsui, K., Yamamoto, H., Takahashi, K., ... & Tanaka, S. (2024). Clinicopathological features and prognosis of primary small bowel adenocarcinoma: a large multicenter analysis of the JSCCR database in Japan. Journal of gastroenterology, 59(5), 376-388. https://doi.org/10.1007/s00535-024-02081-3

Yang, H. C., Chang, A., Visa, M., Yoon, A., Abbott, A., Ma, Y., ... & Bharat, A. (2025). Age-Based Screening for Lung Cancer Surveillance in the US. JAMA Network Open, 8(11), e2546222-e2546222. https://doi.org/10.1186/s13677-025-00759-4