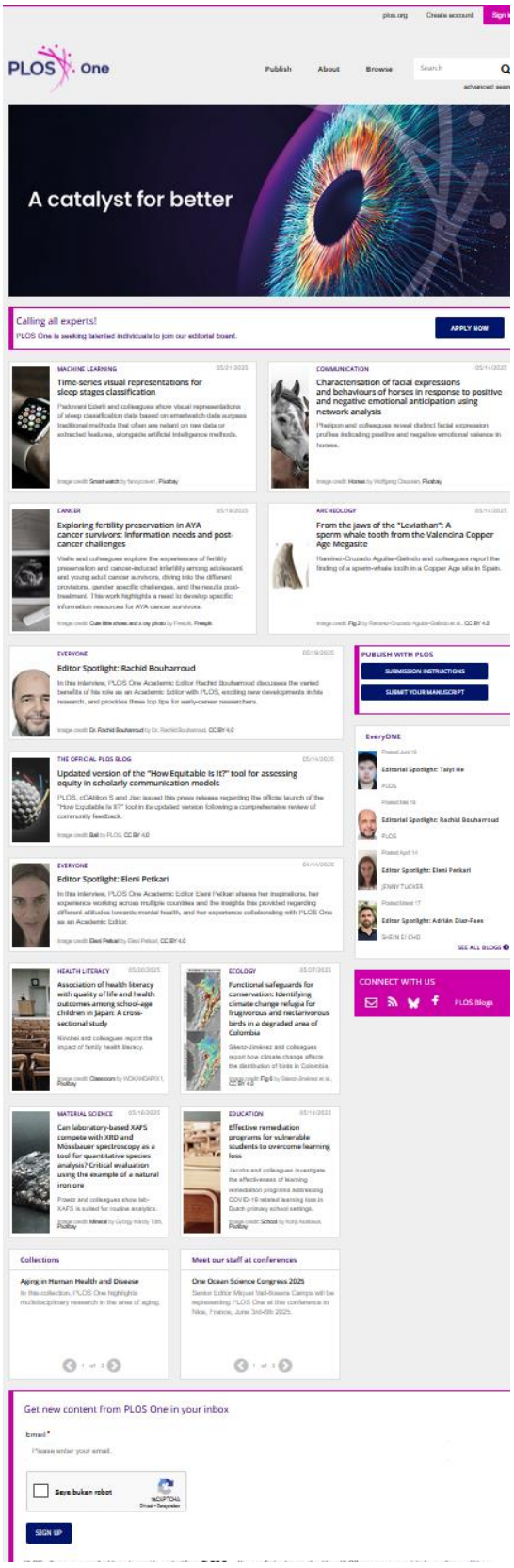
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London School of Hygiene and Tropical Medicine Faculty of Epidemiology and Population Health
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African Population and Health Research Center
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Hamassa University College of Medicine and Health Sciences
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orcid.org/0000-0001-8912-3055
University of Campania Luigi Vanvitelli: Universita degli Studi della Campania Luigi Vanvitelli
ITALY
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orcid.org/0000-0003-2811-6251
Sapienza University of Rome
ITALY
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Henan University, Kaifeng
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Alhamzah F. Abbas
orcid.org/0000-0002-7508-9340
UTM Skudai: Universiti Teknologi Malaysia
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Sections: Economics - General, Management science
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Mazhar Abbas
Universiti Utara Malaysia
MALAYSIA
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orcid.org/0000-0003-1395-4009
Tecnologico de Monterrey
MEXICO
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Faisal Abbas
MY University Islamad
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Muhammad Nawaz Sharif University of Agriculture; Muhammad Nawaz Shareef University of Agriculture
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Faisal Abbas
orcid.org/0000-0002-9312-9859
National University of Sciences and Technology
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Samsen Abbas
orcid.org/0000-0002-7260-3973
Quaid-i-Azam University Islamabad; Quaid-i-Azam University
PAKISTAN
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The Shaikh Ayaz University Shikarpur, Pakistan
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Bu-Ali Sina University; Bu Ali Sina University
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Cairo University
EGYPT
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Dina Abd El-Moneim
orcid.org/0000-0003-3285-0563
Ain Shams university, Faculty of agricultural and environmental sciences
EGYPT
Sections: Agriculture - Plants, Genetics - Gene expression; Epigenetics; Alternative splicing; RNA splicing; Molecular genetics, Genetics - Population genetics; Evolutionary genetics
Classifications: Plant science, Molecular biology, Biology and life sciences, Genetics, Agriculture

Khaled Abd EL-Hamid Abd EL-Hasik
orcid.org/0000-0002-8895-2895
National Research Center (NRC)
EGYPT
Sections: Infectious diseases - General, Microbiology - General, Veterinary science
Classifications: Veterinary science, Biology and life sciences, Molecular biology, Infectious diseases, Microbiology, Medicine and health sciences

Mahfouz Mohamed Moafafa Abd-Elgawad
orcid.org/0000-0002-4731-5988
National Research Centre
EGYPT
Sections: Agriculture - Plants, Pathology
Classifications: Pesticides, Integrated control, Pest control, Agriculture, Biology and life sciences

Yasmine Abd-Elhakim
orcid.org/0000-0002-3846-8385
Zagazig University
EGYPT
Sections: Pharmacology, Pollution research and control, Toxicology
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Mohamed Ezzat Abd El-Hack
orcid.org/0000-0002-2831-8534
Zagazig University Faculty of Agriculture
EGYPT
Sections: Nutrition, Veterinary science
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Hassan Abdalla
orcid.org/0000-0001-7955-955X
University of Udine
ITALY
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Abyeh Abdallah
orcid.org/0000-0003-4812-956X
Qatar University, College of Health Sciences
QATAR
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Marwat A. Abdel-Latif
orcid.org/0000-0002-7996-0121
Damanhour University Faculty of Veterinary Medicine
EGYPT
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Al-Azhar University
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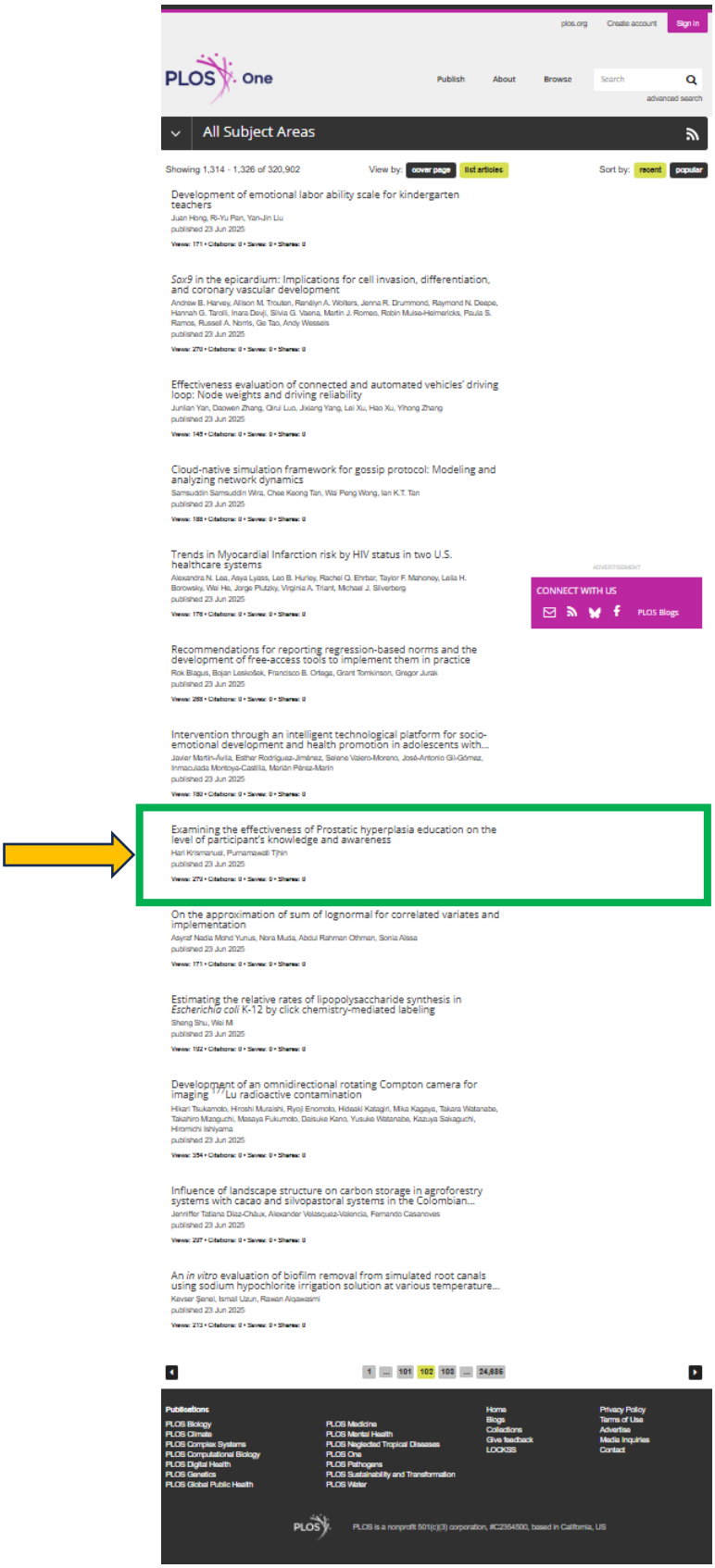

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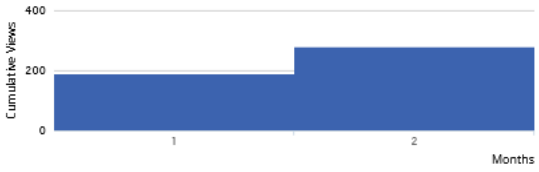

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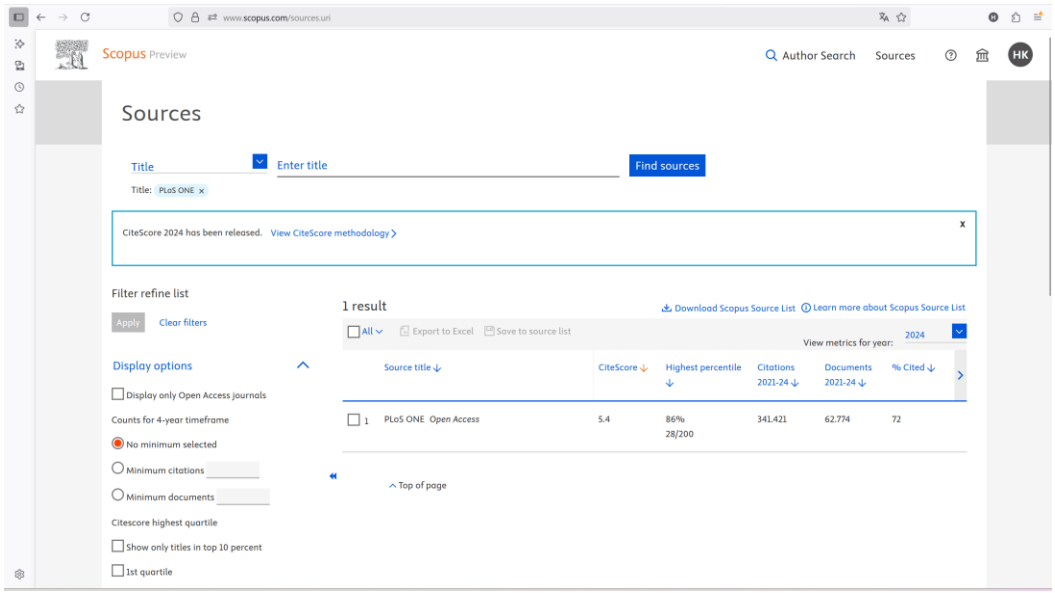
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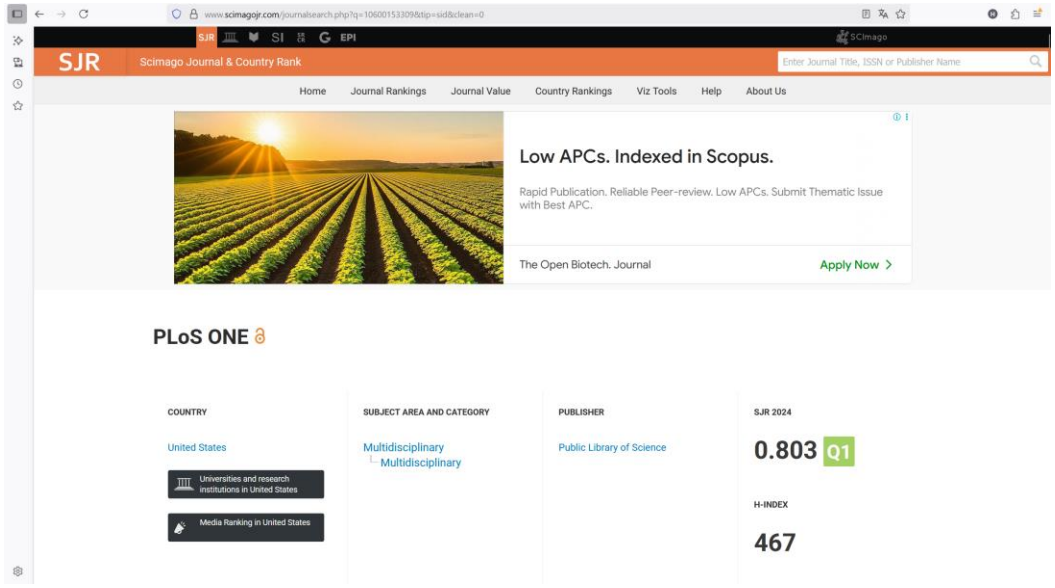
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Hari Krismanuel[1*], **Purnamawati Tjhin**[2]

1 Department of Surgery, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia, **2** Department of Anatomy, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia

* hari_krismanuel@trisakti.ac.id

OPEN ACCESS

Citation: Krismanuel H, Tjhin P (2025) Examining the effectiveness of Prostatic hyperplasia education on the level of participant's knowledge and awareness. PLoS One 20(6): e0325653. https://doi.org/10.1371/journal.pone.0325653

Editor: Mukhtiar Baig, King Abdulaziz University Faculty of Medicine, SAUDI ARABIA

Received: November 26, 2024

Accepted: May 16, 2025

Published: June 23, 2025

Peer Review History: PLOS recognizes the benefits of transparency in the peer review process; therefore, we enable the publication of all of the content of peer review and author responses alongside final, published articles. The editorial history of this article is available here: https://doi.org/10.1371/journal.pone.0325653

Abstract

Prostatic Hyperplasia (PH) is a common condition among older men, contributing significantly to Lower Urinary Tract Symptoms (LUTS). Despite available medical treatments, there is a lack of public awareness about PH, resulting in late diagnoses. This study offers a novel approach by using **a community-based educational intervention** to increase knowledge of PH, leveraging the **International Prostatic Symptom Score (I-PSS)** as a tool for educating elderly men in Bogor, Indonesia. This study aims to evaluate the effectiveness of community-based education on prostatic hyperplasia (PH) in enhancing knowledge and awareness among elderly male participants, addressing the gap in public awareness and the need for early detection, unlike prior studies conducted in clinical settings. By utilizing the International Prostatic Symptom Score (I-PSS), this study provides a structured approach to community health education and symptom self-assessment. A mixed-methods, quasi-experimental pretest-posttest design involved 32 participants aged ≥ 60 years in Bogor, Indonesia. Quantitative data assessed changes in knowledge before and after the intervention, while qualitative insights were gathered through post-education discussions. Statistical analyses, including paired t-tests and effect size (Cohen's d), were conducted to measure the intervention's impact. This study is unique in its application of **I-PSS** for community education and its combination of quantitative and qualitative data to measure knowledge improvement and explore participant perceptions. Significant knowledge improvement was found post-intervention (mean increase: 8.9, $p < 0.001$, Cohen's $d = 0.82$). The integration of qualitative feedback highlighted the relevance and clarity of the intervention while also identifying remaining knowledge gaps, revealing its holistic impact on the participants. The novelty of this study lies in its community-based approach using I-PSS, which is an underexplored method in educating about PH. The results provide strong evidence for using structured community education to promote early detection and improve PH awareness. Future studies could benefit from including control groups and testing this approach in other

Data availability statement: All relevant data are available in the Supplementary Materials and have been deposited in the Figshare repository, accessible via https://doi.org/10.6084/m9.figshare.28595594. These Supplementary Materials can be accessed from the manuscript. Additionally, the Supplementary Materials have been uploaded to PLOS ONE along with the revised manuscript. The Supplemental Materials include: Table S1: A brief summary of the management options discussed during the educational session Table S2: Anonymized participant data Table S3: The detailed SPSS output of our statistical analysis Appendix S1: The complete pre-test and post-test questionnaire We confirm that all participant data presented in Table S2 have been fully anonymized to ensure confidentiality and comply with ethical research standards.

Funding: The author(s) received no specific funding for this work.

Competing interests: The authors have declared that no competing interest exist.

regions for broader applicability. This study demonstrates the effectiveness of a community-based educational intervention using the International Prostatic Symptom Score (I-PSS) in improving knowledge and awareness about Prostatic Hyperplasia (PH) among elderly men. The findings suggest that integrating tools like the I-PSS in community health programs can empower individuals to self-assess their symptoms, promote early detection, and reduce the burden of delayed diagnoses. These results underscore the potential of scalable, low-cost interventions to address health education gaps in similar low-resource settings globally.

Introduction

Prostatic Hyperplasia (PH), also known as Benign Prostatic Hyperplasia (BPH), is a common condition among aging men, particularly those aged 50 and above. It leads to Lower Urinary TractSymptoms (LUTS), such as frequent urination, nocturia, and a weakurinary stream, significantly affecting quality of life. Despite its high prevalence, public awareness of PH remains insufficient, leading to delayed diagnoses and increased healthcare burdens. Early detection and timely management can prevent disease progression and reduce the need for invasive treatments such as surgery [1,2].

Pharmacological treatments, including alpha-blockers and 5-alpha-reductase inhi - bitors, are available but often underutilized due to insufficient public knowledge regarding the symptoms and treatment options for PH. Additionally, studies indicate that many men are hesitant to seek medical advice due to social stigma and lack of awareness, which often leads to late-stage diagnoses. Public education plays a crucial role in addressing these gaps, particularly among older populations [3,4]. Despite the availability of medical interventions, there is a lack of global initiatives focused on community-level education to address the burden of PH. Early detection and management through educational efforts can reduce complications, prevent disease progression, and lower healthcare costs. This study addresses a critical gap in existing research by introducing a community-based educational intervention designed specifically for elderly individuals diagnosed with prostatic hyperplasia, aiming to offer a scalable and accessible model for improving prostate health awareness. By leveraging the International Prostatic Symptom Score (I-PSS) as a novel tool in public health education, this study offers a unique approach that empowers individuals to self-assess their symptoms and promotes early detection in a non-clinical, community setting. Given the global increase in life expectancy and the corresponding rise in prostate health challenges, this research contributes to scalable solutions that can be adapted to diverse healthcare systems worldwide. Unlike traditional clinical approaches, using I-PSS in a community context provides broader access for participants, enabling them to gain a deeper understanding of their condition independently [5–8].

Community - based health education interventions have shown promise in improving public health outcomes by increasing awareness of preventable diseases.

However, limited research has focused on using educational programs specifically designed for PH awareness in low-resource settings. This study fills this gap by integrating I-PSS forms as part of a structured educational program that combines a variety of learning materials and interactive methods. These methods not only address knowledge gaps but also focus on promoting **behavioral changes** in a public setting. This holistic approach enhances the **effectiveness of prostate health education**, making it more accessible and impactful for affected individuals, and ultimately improving their quality of life [5–8].

Prior studies on PH education have predominantly been conducted in **clinical settings**, leaving a significant gap in community-based interventions. This study fills this gap by integrating I-PSS forms as part of a structured educational program that combines a variety of learning materials and interactive methods. These methods not only address knowledge gaps but also focus on promoting **behavioral changes** in a public setting. This holistic approach enhances the **effectiveness of prostate health education**, making it more accessible and impactful for affected individuals, and ultimately improving their quality of life [8–11].

This study aims to determine whether **a structured community-based educational intervention** using the International Prostatic Symptom Score (I-PSS) can effecti - vely improve knowledge and awareness about PH among elderly men. By employing a mixed-methods approach, we measure changes in knowledge and explore participant perceptions to assess the intervention's impact [8–11].

The novelty of this research lies in its integration of the I-PSS into a **community health education program**, targeting elderly men who may have limited access to formal healthcare resources. The intervention's effectiveness in raising awareness and improving knowledge is assessed through a **mixed-methods approach**, combining quantitative and qualitative data to comprehensively evaluate the program's impact. The findings of this study have the potential to inform public health strategies aimed at improving PH awareness and early detection, not only in Indonesia but also in other similar settings worldwide.

Methods

Research design

This study utilized **a prospective mixed methods design,** a novel combination of quantitative and qualitative methods, including pre-test/post-test measurements and interactive question-and-answer sessions to evaluate the impact of health education on participant knowledge. It was conducted in a community setting in Bogor, Indonesia on February 12, 2024 [12–14].

Quantitative component: This research is experimental, using a quasi-experi - mental study with one group pretest-posttest design [15,16]. This quasi-experimental design was selected due to its feasibility and ethical considerations in a real-world community setting. While the absence of a control group is a limitation, it allowed us to reach a larger, diverse population and provided insights into natural variations in knowledge gains. Future studies with control groups are recommended to validate and generalize these findings. **Cohen's d** was calculated to determine the effect size of the intervention on knowledge improvement. The quantitative component involved pre- and post-intervention assessments using structured questionnaires to measure changes in knowledge levels among participants [15–19].

In this research design, a pretest was carried out first, to determine the participants' level of knowledge and awareness of the symptoms and signs of prostatic hyperplasia before education. Next, information about the warning signs and symptoms of PH is given. During this instruction, learners learned about the International Prostatic Symptom Score, or I-PSS. Participants received structured instruction on all aspects of PH, with a specific focus on interpreting their I-PSS results independently. This innovative approach not only enhanced participants' understanding of their health conditions but also equipped them with actionable insights to seek timely medical attention. This strategy differs from prior studies by integrating an educational tool typically reserved for clinical evaluation into a broader public health framework. After

completing the education, an interactive question and answer session was held. The participants were allowed to ask everything about PH. After that, a post test was carried out with the same questions as the pre test questions to compare the level of knowledge and awareness of the participants before and after the education. The study was conducted in Nagrak village, Bogor regency in February 2024 [8,15].

Qualitative Component: The study incorporated a qualitative element through post-education question-and-answer session to enrich and contextualize the quantitative findings. This session were designed to capture participants' perceptions, experiences, and any immediate feedback regarding the health education they received. The qualitative data were transcribed and analyzed using thematic analysis to identify key themes that could inform the interpretation of quantitative results and provide deeper insight into the participants' understanding [12–14].

Population and sample

The population in this study were men aged ≥ 60 years in Ciangsana and Nagrak villages, Gunung Putri District, Bogor Regency. This research was conducted on February 12, 2024. Here's a general formula for sample size estimation in the context of a t-test (assuming a two-tailed test) [20,21]:

$$n = \frac{2 \cdot (Z\alpha/2 + Z\beta)^2 \, SD^2}{\text{Effect Size}^2}$$

Where:
n is the required sample size.
Zα/2 is the critical value for the desired level of significance (α).
Zβ is the critical value for the desired power (1 − β).
SD is the estimated standard deviation in the population.
Effect Size is the expected size of the difference between groups.
For a **95% confidence level**, Zα/2 is **1.96**, and for **90% power**, **σ2 = 25, δ = 2,** samples size should be collected are 29.54 ≈ 30 [14–17].

Inclusion and exclusion criteria

Inclusion criteria for this study included male participants aged ≥ 60 years, and residing in Nagrak Village or the surrounding area. Inclusion criteria required participants to be able to attend the session, literate and fluent in Bahasa Indonesia, able to attend the session and provide informed consent. Participants must be willing to take part in the entire series of interventions and be able to communicate and read well. **Exclusion criteria** included participants with severe comorbidities such as diabetes or heart disease, cognitive or psychological disorders, and unwillingness to participate fully, participants who could not speak Bahasa Indonesia and illiterate. In addition, participants who had received similar education previously were also excluded to avoid bias in assessing the impact of the intervention.

Participants

After inclusion and exclusion criteria, a total of **32 elderly men** aged 60 years or older participated in this study. Participants were recruited through community outreach programs and local healthcare facilities. The participants were randomly assigned to the intervention group without a control group due to logistical and ethical considerations in the community setting.

The demographic characteristics of the study participants are summarized in Table 1. All participants had an elementary school education, ensuring uniformity in educational background and minimizing potential confounding effects related to knowledge diffe- rences.

Table 1. Demographic Characteristics of Participants.

Variable	Category	n (%)
Age Group	60-65	13 (40.62)
	66-70	9 (28.13)
	>70	10 (31.25)
Education Level	Elementary School	32 (100)

https://doi.org/10.1371/journal.pone.0325653.t001

Educational intervention

Educational interventions focus on providing information about prostatic hyperplasia, its symptoms, available treatments, and lifestyle modifications. The format is that participants receive an education/counseling session conducted by a surgeon. The education/ counseling session lasts approximately 30 minutes. Educational materials in the form of power point files, posters, I-PSS forms and visual aids, are used to improve understanding.

The intervention consisted of a **single, structured educational session** delivered to participants after they completed the pretest. The program included a **combination of face-to-face lectures, printed materials, and interactive group discussions** focusing on the causes, symptoms, and management options for PH, with particular emphasis on the importance of early detection and lifestyle modifications. The **International Prostatic Symptom Score (I-PSS)** was introduced as a self-assessment tool for the participants to track their symptoms, empowering them to evaluate their condition independently and seek timely medical advice.

The intervention took place in a community hall to ensure accessibility for all participants. Educational materials were provided in **Bahasa Indonesia**, and entire the session lasted approximately **60 minutes,** comprising a 30-minute structured lecture followed by a 30-minute interactive group discussion. During the session, trained community health workers facilitated the discussion, answering questions and encouraging participants to complete the I-PSS form as part of the educational process.

A brief overview of management options for prostatic hyperplasia was provided during the educational session but was not included in the pretest/posttest assessment [22,23]. Further details on management options are available in Table S1 (Supplementary Materials). The dataset has been deposited in Figshare and can be accessed through this link.

Pretest and posttest procedures

A pre-test was conducted before the educational intervention to assess participants' baseline knowledge and awareness. Participants completed the pretest individually in a supervised setting. After the educational intervention, a single interactive question-and-answer session was held to ensure participants' understanding and to address any remaining questions. After completing the interactive question-and-answer session, a post-test was administered to evaluate the impact of the intervention. The same questionnaire was used for both the pre-test and post-test to ensure consistency in measurement. The questionnaire consisted of 20 true-or-false questions designed to assess participants' understanding of lower urinary tract symptoms (LUTS) associated with Prostatic hyperplasia (PH). These questions were structured based on the International Prostatic Symptom Score (I-PSS), covering aspects such as incomplete emptying, frequency, intermittency, urgency, weak stream, straining, and nocturia. Given that participants were from a low-education background, the test format was simplified to a True (B)/ False (S) system to facilitate comprehension and response accuracy.

During the educational sessions, participants were introduced to the International Prostatic Symptom Score (I-PSS) to enhance their understanding of LUTS and its assessment. This approach ensured that participants were familiar with the symptoms assessed in both tests and minimized potential bias in self-reported responses. By providing clear explanations of PH warning signs, the intervention aimed to address limitations related to measurement tools. A one-group pretest-posttest design was employed to measure the effectiveness of the intervention [12–14].

The pre-test and post-test questions used to assess participants' knowledge before and after the community-based education session are provided in Appendix S1 (Supplementary Materials). The dataset has been deposited in Figshare and can be accessed through this link.

Data collection

Data collection was conducted on February 12, 2024, involving 32 elderly menaged 60 years or older recruited through local community outreach programs. Data were collected through a combination of **pre- and post-intervention surveys** to assess changes in participants' knowledge and awareness. The pretest was conducted at the beginning of the program, while the posttest was administered at the conclusion of the educational session.

Quantitative data. Knowledge of PH was measured using a **standardized questionnaire** that assessed participants' understanding of the symptoms, risk factors, and management strategies for PH. Participants' **I-PSS scores** were also used to evaluate their understanding of their own symptoms before and after the intervention.

Qualitative data. Focus group discussions (FGDs) were conducted after the intervention to gain insights into participants' perceptions of the program. These discussions were audio-recorded and transcribed for thematic analysis. Participants were asked to reflect on their knowledge of PH, the usefulness of the I-PSS tool, and any changes in their behavior regarding PH awareness and self-assessment.

Data analysis

Kolmogorov-Smirnov Test was used for the distribution normality test [21].

Quantitative data were analyzed using **paired t-tests** to assess significant differences between pretest and posttest scores for knowledge and I-PSS scores [24–27]. **Cohen's d** was calculated to determine the intervention's effect size on knowledge improvement [18,19]. The **qualitative data** from the focus groups were analyzed thematically using **NVivo software** to identify common themes regarding changes in awareness, the perceived usefulness of the educational materials, and behavioral changes [12–14].

All statistical analyses were conducted using **SPSS version 25**. The level of significance was set at $\mathbf{p < 0.05}$ for all tests. Steps to calculate effect-size [18,19]:

1. Calculate SD_{pooled}:

$$SD_{pooled} = \sqrt{\frac{SD_{pre}^2 + SD_{post}^2}{2}}$$

2. Calculate effect size (Cohen's d):

$$d = \frac{M_{post-test} - M_{pre-test}}{SD_{pooled}}$$

M = Mean pre-test dan post-test.

SD pooled = Combined standard deviation, calculated from the pre-test and post-test SD.

Ethical considerations

The study was conducted in accordance with ethical guidelines and approved by the Ethical Review Committee of the Faculty of Medicine, Universitas Trisakti under ethical permission number 057/KER/FK/II/2024. The **written informed consent form**, detailing the study's objectives, procedures, potential risks, and benefits, was submitted to the Ethical Review Committee as part of the ethical approval process.

Prior to participation, all participants provided **written informed consent**. The consent process included an explanation of the study's objectives and procedures, and participants were informed that their participation was voluntary and that they could withdraw at any time without consequences. To ensure understanding, participants were asked to read the consent form thoroughly before signing. Any unclear terms were explained verbally by the researchers. The consent forms were signed by participants and witnessed by an impartial third party present during the process. Participants who could not speak Indonesian or were illiterate were excluded from the study. No minors were involved, and thus, parental or guardian consent was not applicable.

To ensure confidentiality, all data were anonymized, and identifying information was not collected. The anonymized datasets were securely stored and accessible only to the research team.

Results

1. Participant characteristics

A total of **32 elderly men** participated in the study. Most participants reported having some prior awareness of urinary symptoms but limited knowledge about **Prostatic Hyperplasia (PH)** and its management options. None of the participants had received prior formal education about PH or the use of the International Prostatic Symptom Score (I-PSS).

The Univariate analysis in this study describes the characteristics of the participants (age), and level of knowledge before (pre-test) and after counseling (post-test).

Before assessing the impact of the educational intervention, it is essential to describe the demographic characteristics of the participants. **Table 2** presents the age distribution of the participants, which may influence their baseline knowledge and learning outcomes.

There were 32 participants out of the 30 planned participants (more than 100% planned).

To determine whether the participant distribution across age groups was signifi -cantly different from an expected equal distribution, a **Chi-Square Goodness of Fit test** was conducted. The results showed no statistically significant difference ($\chi^2(2) = 0.813$, $p = 0.666$), indicating that the age distribution was **homogeneous**. This suggests that age was not a confounding factor in evaluating the impact of the intervention. Further statistical details are provided in Table S3 (Supplementary Materials).

2. Quantitative findings

Educational interventions are expected to enhance participants' knowledge, equipping them with essential information about PH symptoms and management. The following analysis presents the impact of the education session.

Table 3 presents the level of knowledge before education. The majority of participants (62.50%) had a moderate level of knowledge, while 28.12% were categorized as having poor knowledge. Only 9.38% demonstrated a good understanding of PH symptoms and management before the session. These findings indicate that prior to the intervention, a significant portion of participants had limited knowledge about the topic, highlighting the need for educational support (as shown in Table 3).

Table 4 illustrates the participants' level of knowledge after the education. A clear improvement was observed in participants' knowledge levels following the educational intervention. The results indicate a positive impact of the intervention,

Table 2. Age Distribution of Participants.

Age (years)	Frequency	%
60-65	13	40.62
66-70	9	28.13
>70	10	31.25

https://doi.org/10.1371/journal.pone.0325653.t002

Table 3. Level of knowledge before education.

Pre-test Scores	Frequency	%
Good (85–100)	3	9.38
Moderate (60–80)	20	62.50
Poor (<60)	9	28.12

https://doi.org/10.1371/journal.pone.0325653.t003

with the proportion of participants in the **good** knowledge category increasing more than doubled, from 9.38% to 21.87%. Notably, no participants were remaining in the **poor** category, suggesting that all individuals improved their understanding. This suggests that even a single educational session can significantly enhance knowledge retention.

Given the importance of structured learning, these findings reinforce the value of community-based education in promoting awareness and proactive health management.

From the comparison of the pre-test results with the post-test, it was found that participants' knowledge and awareness of PH increased after the education was provided.

To ensure the appropriateness of further statistical analyses, a normality test was conducted using the One-Sample Kolmogorov-Smirnov Test. Table 5 presents the results, indicating whether the residual values follow a normal distribution.

The results of the Kolmogorov-Smirnov test show that the significance value is 0.200, which is greater than 0.05. This indicates that the residual values are normally distributed, fulfilling the assumption required for parametric statistical analysis [21].

Table 4. Level of knowledge after education.

Post-test Scores	Frequency	%
Good (85–100)	7	21.87
Moderate (60–80)	25	78.13
Poor (<60)	0	0

https://doi.org/10.1371/journal.pone.0325653.t004

Table 5. One-Sample Kolmogorov-Smirnov Test for Normality Distribution.

Output interpretation	One-Sample Kolmogorov-Smirnov Test	Unstandardized Residual
N		32
Normal Parameter[a,b]	Mean	.0000000
	Std. Deviation	9.86432692
Most Extreme Differences	Absolute	.089
	Positive	.086
	Negative	−0.89
Test Statistic		0.89
Asymp. Sig. (2-tailed)[c]		.200[d]
Monte Carlo Sig. (2-tailed)[c]	Sig.	.737
	99% Confidence Interval Lower Bound	.725
	Upper Bound	.748

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

d. This is a lower bound of the true significance.

e. Lilliefors' method based on 10000 Monte Carlo samples with starting seed 2000000.

https://doi.org/10.1371/journal.pone.0325653.t005

Table 6 presents the descriptive statistics for both the pre-test and post-test scores. These statistics provide an overview of the changes in participants' knowledge levels after the educational intervention. By comparing the mean values, standard deviations, and standard error means, we can observe the overall trend of improvement after the intervention.

Paired samples statistics

This output shows the summary results of descriptive statistics from both pre-test and post-test samples. For the pre-test scores, the average or mean value was 66.25, while the average or mean value of the post-test results was 75.1563. The standard deviation value for the pre-test is 11.57026 and the post-test is 10.03899. The standard Error Mean of the pre-test is 2.04535 and the post-test is 1.77466. Because the average post-test score of 75.1563 is greater than the pre-test score of 66.25, descriptively there is an increase in the average post-test score compared to the pre-test score [24–27].
Table 7 presents the correlation analysis between pre-test and post-test scores. This analysis examines whether there is a significant relationship between participants' scores before and after the intervention. The correlation coefficient and significance values help determine the strength and direction of this association.
The output in the second section is the outcome of the relationship or correlation between the two variables or data, specifically the pre-test and post-test. The output above shows the results of the correlation test or the relationship between the pre- and post-test scores. Based on the output above, it is known that the correlation coefficient value is 0.186 with a significance value of 0.309. Because the significance value is 0.309 > 0.05, it is possible to draw the conclusion that there is no meaningful relationship between the pre-test and post-test variables [24–27].
Given that there was no significant correlation, a paired samples t-test was conducted to examine whether there was a statistically significant difference between pre-test and post-test scores [24–27].

Table 6. Sample Paired T-Test Output interpretation.

Sample Paired T-Test					
Output interpretation					
		Paired Samples Statistics			
		Mean	**N**	**Std. Deviation**	**Std. Error Mean**
Pair 1	Pre Test	66.2500	32	11.57026	2.04535
	Post Test	75.1563	32	10.03899	1.77466

https://doi.org/10.1371/journal.pone.0325653.t006

Table 7. Pair Samples Correlations.

		Paired Samples Correlations			
					Significance
		N	**Correlations**	**One-sided p**	**Two-sided p**
Pair 1	**Pre test & Post test**	32	.186	.154	.309

https://doi.org/10.1371/journal.pone.0325653.t007

Table 8. Paired Samples Test.

		Paired Samples Test								
		Paired Differences							**Significance**	
					95% Confidence					
					Interval of the Difference					
		Mean	**Std. Deviation**	**Std. Error Mean**	**Lower**	**Upper**	**t**	**df**	**One-Sided p**	**Two-Sided p**
Pair 1	Pre test-Post test	−8.90625	13.83861	2.44634	−13.89560	−3.91690	−3.641	31	<,001	<,001

https://doi.org/10.1371/journal.pone.0325653.t008

Table 8 presents the results of the paired samples t-test, which was conducted to determine whether there is a statistically significant difference between the pre-test and post-test scores. This test assesses whether the observed changes in participants' performance after the intervention are likely due to the treatment rather than random variation. By analyzing the mean difference, confidence intervals, and significance values, we can evaluate the effectiveness of the intervention. Furthermore, the paired samples t-test was performed to assess whether the observed difference in pre-test and post-test scores is statistically significant. The results show that the mean difference between the two tests is 8.90625, with a standard deviation of 13.83861. The two-sided significance value of <0.001 is smaller than 0.05, indicating that Ha is accepted. Therefore, it can be concluded that there is a significant difference between the pre-test and post-test results. This finding confirms that the intervention or treatment applied between the two tests had a measurable impact on participants' performance [24–27].

After the paired sample t-test showed a significant difference ($p < 0.001$), we calculated the effect size using Cohen's d to assess the strength of the intervention impact.

Steps to calculate effect-size

1. Calculate **SD** $_{pooled}$:

$$SD_{pooled} = \sqrt{\frac{(11,570262^2 + 10,038992^2)}{2}}$$

$$\approx 10,955$$

2. Calculate **Cohen's d**:

$$d = \frac{75,1563 - 66,25}{10,955} \approx 0,82$$

Thus, the effect size (Cohen's d) = 0.82, which indicates a large impact of the educational intervention [14,15]. Paired-sample t-test showed a significant difference between pre-test and post-test knowledge scores (pre-test average = 66.25, post-test average = 75.16, p < 0.001). The effect size value (Cohen's d) of 0.82 shows that education has a significant impact (classified as large) and is practically relevant in increasing participants' knowledge [18,19].

3. Qualitative Findings

The qualitative findings supported and enriched these results. Thematic analysis of focus group discussions revealed three major themes reflecting participants' experiences and perceptions of the intervention:

1. Increased understanding of PH symptoms and management

Participants reported a clearer understanding of PH symptoms, such as urinary frequency and nocturia, and their association with aging. Many expressed confidence in identifying these symptoms early and seeking medical advice.

2. Empowerment through the I-PSS tool

The introduction of the I-PSS form was highly appreciated, as participants found it a practical and easy-to-use tool for self-assessment. Several participants expressed that using the tool made them feel more in control of their health.

3. Suggestions for program improvement

While participants valued the session, some suggested that more interactive activities, such as role-playing or case studies, could enhance their understanding. A few also recommended involving family members in future sessions to raise broader awareness.

4. Overall impact of the intervention

The combined findings from quantitative and qualitative analyses highlight the effectiveness of the educational program in improving participants' knowledge and awareness of PH. The significant changes in pretest and posttest scores, coupled with positive feedback from participants, suggest that community-based interventions using tools like I-PSS can have a meaningful impact on promoting early detection and proactive management of PH among elderly populations.

Discussion

This study evaluated the effectiveness of a community-based educational intervention in enhancing knowledge and awareness about **Prostatic Hyperplasia (PH)** among elderly men in Bogor, Indonesia. The findings demonstrate significant improvements in participants' knowledge and awareness of PH, as evidenced by increases in knowledge scores and self-reported understanding of symptoms using the **International Prostatic Symptom Score (I-PSS)**. The results highlight the potential of structured community-based programs to address gaps in health education for elderly populations.

1. Interpretation of findings

The significant increase in knowledge scores from pretest to posttest underscores the effectiveness of the intervention. The mean pretest score of **66.25 ± 11.57** increased to **75.16 ± 10.04**, reflecting a large effect size (Cohen's d = 0.82). These results align with previous studies indicating that targeted health education can substantially improve knowledge and promote health-seeking behaviors in underserved populations.

The improvement in **I-PSS scores** further suggests that participants gained a better understanding of their urinary symptoms, potentially enabling them to seek medical care earlier [25–27]. Notably, the relatively uniform education level among participants may have contributed to minimizing variability in knowledge acquisition, allowing for a more consistent intervention effect. This uniformity serves as a strength of the study, as it reduces potential confounding effects related to baseline disparities in health literacy.

Qualitative findings provided deeper insights into participants' experiences.

Participants appreciated the use of the I-PSS tool, reporting that it empowered them to self-assess their symptoms and monitor their health. This suggests that integrating practical tools like the I-PSS into community health programs can enhance their impact by promoting autonomy in managing chronic conditions. However, some participants expressed a desire for more interactive components, such as role-playing or family involvement, to reinforce learning and encourage broader awareness [27–29].

2. Novelty and contribution to the literature

This study is among the first to introduce the **I-PSS tool** in a non-clinical, community-based educational setting, highlighting its feasibility and effectiveness as a public health education tool. Previous studies on PH education have predominantly been conducted in clinical contexts, focusing on patients already seeking care. By contrast, this study targeted individuals within the community, enabling broader access to education and promoting proactive health management.

The findings also address a critical research gap regarding the use of structured educational interventions for elderly populations in low-resource settings. The single-session format demonstrated that even brief interventions can yield significant improvements in knowledge and awareness, making it a scalable and cost-effective approach for similar populations worldwide.

The findings also contribute to the growing body of evidence supporting the integration of symptom assessment tools into community-based health education programs. The successful implementation of the I-PSS in this setting suggests that similar tools could be adapted for other chronic conditions to facilitate early detection and encourage timely medical consultation.

3. Implications for public health

The implications of this study extend beyond the immediate community. The scalable nature of the intervention suggests its applicability to other low- and middle-income countries (LMICs) facing similar challenges with PH awareness and healthcare access. By empowering individuals to self-assess and seek timely medical advice, programs like this can reduce the burden of late-stage diagnoses and associated complications, ultimately alleviating healthcare costs. Moreover, the inclusion of practical tools like the I-PSS provides a framework for integrating patient-centered approaches into community health initiatives. These findings support the integration of health education into routine public health campaigns, particularly in regions with limited access to healthcare infrastructure.

4. Limitations and directions for future research

Despite its promising findings, this study has several limitations. First, the quasi experimental design lacked a control group, which limits the ability to attribute observed improvements solely to the intervention. Future studies should consider including control groups to strengthen causal inferences. Second, the sample size was relatively small, and the study was conducted in a single community, which may limit the generalizability of the findings. Expanding the study to include diverse settings and larger populations would provide more robust evidence of the intervention's effectiveness. Additionally, while the I-PSS tool was well-received, future research could explore the long-term impact of such interventions on health outcomes, including symptom management and healthcare utilization. Further studies could also assess the effectiveness of incorporating family members into the educational process to enhance support systems for elderly individuals.

Conclusions

This study demonstrates the effectiveness of a single-session, community-based educational intervention in improving knowledge and awareness about **Prostatic Hyperplasia (PH)** among elderly men. By integrating the **International Prostatic Symptom Score (I-PSS)** as a public health education tool, this study highlights a novel approach to addressing health education gaps in low-resource settings.

The significant improvements in knowledge and awareness observed in this study underscore the potential of such interventions to promote early detection and proactive management of PH. These findings have broader implications for public health strategies, suggesting that scalable, community-centered approaches can contribute to reducing the healthcare burden associated with late-stage PH diagnoses. However, due to the relatively homogeneous educational background of participants, the influence of education level on the effectiveness of the intervention could not be analyzed. Therefore, our findings focus on the overall knowledge improvement observed before and after the educational intervention without comparing its impact based on education level.

These findings have broader implications for public health strategies, suggesting that scalable, community-centered approaches can contribute to reducing the healthcare burden associated with late-stage PH diagnoses.

Future research should aim to validate these findings in diverse settings, incorporate control groups, and evaluate long-term impacts on health behaviors and outcomes. Expanding the scope of such programs to include family involvement and interactive methods could further enhance their effectiveness and reach.

Supporting information

S1 File. Supplementary Materials. This document contains additional data that support the findings presented in the manuscript.
(PDF)

Author contributions

Conceptualization: Hari Krismanuel.

Data curation: Purnamawati Tjhin.

Formal analysis: Hari Krismanuel.

Investigation: Hari Krismanuel.

Methodology: Hari Krismanuel.

Visualization: Purnamawati Tjhin.

Writing – original draft: Hari Krismanuel.

Writing – review & editing: Hari Krismanuel.

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Examining the effectiveness of prostatic hyperplasia education on the level of participant's knowledge and awareness.

by Hari Krismanuel

Submission date: 16-Mar-2025 11:25PM (UTC+0700)
Submission ID: 2616020810
File name: ation_on_the_level_of_Participant_s_knowledge_and_awareness.docx (507.74K)
Word count: 5678
Character count: 36217

Abstract

Prostatic Hyperplasia (PH) is a common condition among older men, contributing significantly to Lower Urinary Tract Symptoms (LUTS). Despite available medical treatments, there is a lack of public awareness about PH, resulting in late diagnoses. This study offers a novel approach by using **a community-based educational intervention** to increase knowledge of PH, leveraging the **International Prostatic Symptom Score (I-PSS)** as a tool for educating elderly men in Bogor, Indonesia. This study aims to evaluate the effectiveness of community-based education on prostatic hyperplasia (PH) in enhancing knowledge and awareness among elderly male participants, addressing the gap in public awareness and the need for early detection, unlike prior studies conducted in clinical settings. By utilizing the International Prostatic Symptom Score (I-PSS), this study provides a structured approach to community health education and symptom self-assessment. A mixed-methods, quasi-experimental pretest-posttest design involved 32 participants aged ≥ 60 years in Bogor, Indonesia. Quantitative data assessed changes in knowledge before and after the intervention, while qualitative insights were gathered through post-education discussions. Statistical analyses, including paired t-tests and effect size (Cohen's d), were conducted to measure the intervention's impact. This study is unique in its application of **I-PSS** for community education and its combination of quantitative and qualitative data to measure knowledge improvement and explore participant perceptions. Significant knowledge improvement was found post-intervention (mean increase: 8.9, $p < 0.001$, Cohen's $d = 0.82$). The integration of qualitative feedback highlighted the relevance and clarity of the intervention while also identifying remaining knowledge gaps, revealing its holistic impact on the participants. The novelty of this study lies in its community-based approach using I-PSS, which is an underexplored method in educating about PH. The results provide strong evidence for using structured community education to promote early detection and improve PH awareness. Future studies could benefit from including control groups and testing this approach in other regions for broader applicability. This study demonstrates the effectiveness of a community-based educational intervention using the International Prostatic Symptom Score (I-PSS) in improving knowledge and awareness about Prostatic Hyperplasia (PH) among elderly men. The findings suggest that integrating tools like the I-PSS in community health programs can empower individuals to self-assess their symptoms, promote early detection, and reduce the burden of delayed diagnoses. These results underscore the potential of scalable, low-cost interventions to address health education gaps in similar low-resource settings globally.

Keywords:
Aging population, Community Health Intervention, International Prostatic Symptom Score (I-PSS), knowledge and awareness, Lower Urinary Tract Symptoms (LUTS), Prostatic hyperplasia Education.

Introduction

Prostatic Hyperplasia (PH), also known as Benign Prostatic Hyperplasia (BPH), is a common condition among aging men, particularly those aged 50 and above. It leads to Lower Urinary Tract Symptoms (LUTS), such as frequent urination, nocturia, and a weak urinary stream, significantly affecting quality of life. Despite its high prevalence, public awareness of PH remains insufficient, leading to delayed diagnoses and increased healthcare burdens. Early detection and timely management can prevent disease progression and reduce the need for invasive treatments such as surgery [1,2].

Pharmacological treatments, including alpha-blockers and 5-alpha-reductase inhibitors, are available but often underutilized due to insufficient public knowledge regarding the symptoms and treatment options for PH. Additionally, studies indicate that many men are hesitant to seek medical advice due to social stigma and lack of awareness, which often leads to late-stage diagnoses. Public education plays a crucial role in addressing these gaps, particularly among older populations [3,4].

Despite the availability of medical interventions, there is a lack of global initiatives focused on community-level education to address the burden of PH. Early detection and management through educational efforts can reduce complications, prevent disease progression, and lower healthcare costs. This study addresses a critical gap in existing research by introducing a community-based educational intervention designed specifically for elderly individuals diagnosed with prostatic hyperplasia, aiming to offer a scalable and accessible model for improving prostate health awareness. By leveraging the International Prostatic Symptom Score (I-PSS) as a novel tool in public health education, this study offers a unique approach that empowers individuals to self-assess their symptoms and promotes early detection in a non-clinical, community setting. Given the global increase in life expectancy and the corresponding rise in prostate health challenges, this research contributes to scalable solutions that can be adapted to diverse healthcare systems worldwide. Unlike traditional clinical approaches, using I-PSS in a community context provides broader access for participants, enabling them to gain a deeper understanding of their condition independently [5,6,7,8].

Community-based health education interventions have shown promise in improving public health outcomes by increasing awareness of preventable diseases. However, limited research has focused on using educational programs specifically designed for PH awareness in low-resource settings. This study fills this gap by integrating I-PSS forms as part of a structured educational program that combines a variety of learning materials and interactive methods. These methods not only address knowledge gaps but also focus on promoting **behavioral changes** in a public setting. This holistic approach enhances the **effectiveness of prostate health education**, making it more accessible and impactful for affected individuals, and ultimately improving their quality of life [5,6,7,8].

Prior studies on PH education have predominantly been conducted in **clinical settings**, leaving a significant gap in community-based interventions. This study fills this gap by integrating I-PSS forms as part of a structured educational program that combines a variety of learning materials and interactive methods. These methods not only address knowledge gaps but also focus on promoting **behavioral changes** in a public setting.

This holistic approach enhances the **effectiveness of prostate health education**, making it more accessible and impactful for affected individuals, and ultimately improving their quality of life [8,9,10,11].

This study aims to determine whether **a structured community-based educa - tional intervention** using the International Prostatic Symptom Score (I-PSS) can effecti - vely improve knowledge and awareness about PH among elderly men. By employing a mixed-methods approach, we measure changes in knowledge and explore participant perceptions to assess the intervention's impact [8,9,10,11].

The novelty of this research lies in its integration of the I-PSS into a **community health education program**, targeting elderly men who may have limited access to formal healthcare resources. The intervention's effectiveness in raising awareness and improving knowledge is assessed through a **mixed-methods approach**, combining quantitative and qualitative data to comprehensively evaluate the program's impact. The findings of this study have the potential to inform public health strategies aimed at improving PH awareness and early detection, not only in Indonesia but also in other similar settings worldwide.

Methods

Research design

This study utilized **a prospective mixed methods design,** a novel combination of quantitative and qualitative methods, including pre-test/post-test measurements and interactive question-and-answer sessions to evaluate the impact of health education on participant knowledge. It was conducted in a community setting in Bogor, Indonesia on February 12, 2024 [12,13,14].

Quantitative component: This research is experimental, using a quasi-experi- mental study with one group pretest-posttest design [15,16]. This quasi-experimental design was selected due to its feasibility and ethical considerations in a real-world community setting. While the absence of a control group is a limitation, it allowed us to reach a larger, diverse population and provided insights into natural variations in knowledge gains. Future studies with control groups are recommended to validate and generalize these findings. **Cohen's d** was calculated to determine the effect size of the intervention on knowledge improvement. The quantitative component involved pre- and post-intervention assessments using structured questionnaires to measure changes in knowledge levels among participants [15,16,17,18,19].

In this research design, a pretest was carried out first, to determine the participants' level of knowledge and awareness of the symptoms and signs of prostatic hyperplasia before education. Next, information about the warning signs and symptoms of PH is given. During this instruction, learners learned about the International Prostatic Symptom Score, or I-PSS. Participants received structured instruction on all aspects of PH, with a specific focus on interpreting their I-PSS results independently. This innovative approach not only enhanced participants' understanding of their health conditions but also equipped them with actionable insights to seek timely medical attention. This strategy differs from prior

studies by integrating an educational tool typically reserved for clinical evaluation into a broader public health framework. After completing the education, an interactive question and answer session was held. The participants were allowed to ask everything about PH. After that, a post test was carried out with the same questions as the pre test questions to compare the level of knowledge and awareness of the participants before and after the education. The study was conducted in Nagrak village, Bogor regency in February 2024 [8,15].

Qualitative Component: The study incorporated a qualitative element through post-education question-and-answer session to enrich and contextualize the quantitative findings. This session were designed to capture participants' perceptions, experiences, and any immediate feedback regarding the health education they received. The qualitative data were transcribed and analyzed using thematic analysis to identify key themes that could inform the interpretation of quantitative results and provide deeper insight into the participants' understanding [12,13,14].

Population and Sample

The population in this study were men aged ≥ 60 years in Ciangsana and Nagrak villages, Gunung Putri District, Bogor Regency. This research was conducted on February 12, 2024. Here's a general formula for sample size estimation in the context of a t-test (assuming a two-tailed test) [20,21]:

$$n = \frac{2 \cdot (Z\alpha/2 + Z\beta)^2 \cdot SD^2}{\text{Effect Size}^2}$$

Where:
n is the required sample size.
Zα/2 is the critical value for the desired level of significance (α).
Zβ is the critical value for the desired power (1−β).
SD is the estimated standard deviation in the population.
Effect Size is the expected size of the difference between groups.

For a **95% confidence level**, Zα/2 is **1.96**, and for **90% power**, **σ2=25, δ=2,** samples size should be collected are 29.54 ≈ 30 [14,15,16,17].

Inclusion and Exclusion Criteria

Inclusion criteria for this study included male participants aged ≥ 60 years, and residing in Nagrak Village or the surrounding area. Inclusion criteria required participants to be able to attend the session, literate and fluent in Bahasa Indonesia, able to attend the session and provide informed consent. Participants must be willing to take part in the entire series of interventions and be able to communicate and read well. **Exclusion criteria** included participants with severe comorbidities such as diabetes or heart disease, cognitive

or psychological disorders, and unwillingness to participate fully, participants who could not speak Bahasa Indonesia and illiterate. In addition, participants who had received similar education previously were also excluded to avoid bias in assessing the impact of the intervention.

Participants

After inclusion and exclusion criteria, a total of **32 elderly men** aged 60 years or older participated in this study. Participants were recruited through community outreach programs and local healthcare facilities. The participants were randomly assigned to the intervention group without a control group due to logistical and ethical considerations in the community setting.

The demographic characteristics of the study participants are summarized in Table 1. All participants had an elementary school education, ensuring uniformity in educational background and minimizing potential confounding effects related to knowledge differences.

Table 1. Demographic Characteristics of Participants.

Variable	Category	n (%)
Age Group	60–65	13 (40.62)
	66–70	9 (28.13)
	>70	10 (31.25)
Education Level	Elementary School	32 (100)

Educational Intervention

Educational interventions focus on providing information about prostatic hyperplasia, its symptoms, available treatments, and lifestyle modifications. The format is that participants receive an education/counseling session conducted by a surgeon. The education/ counseling session lasts approximately 30 minutes. Educational materials in the form of power point files, posters, I-PSS forms and visual aids, are used to improve understanding.

The intervention consisted of a **single, structured educational session** delivered to participants after they completed the pretest. The program included a **combination of face-to-face lectures, printed materials, and interactive group discussions** focusing on the causes, symptoms, and management options for PH, with particular emphasis on the importance of early detection and lifestyle modifications. The **International Prostatic Symptom Score (I-PSS)** was introduced as a self-assessment tool for the participants to track their symptoms, empowering them to evaluate their condition independently and seek timely medical advice.

The intervention took place in a community hall to ensure accessibility for all participants. Educational materials were provided in **Bahasa Indonesia**, and entire the session lasted approximately **60 minutes,** comprising a 30-minute structured lecture followed by a 30-minute interactive group discussion. During the session, trained community health workers facilitated the discussion, answering questions and encouraging participants to

complete the I-PSS form as part of the educational process.

A brief overview of management options for prostatic hyperplasia was provided during the educational session but was not included in the pretest/posttest assessment [22,23]. Further details on management options are available in Table S1 (Supplementary Materials). The dataset has been deposited in Figshare and can be accessed through this link.

Pretest and Posttest Procedures

A pre-test was conducted before the educational intervention to assess participants' baseline knowledge and awareness. Participants completed the pretest individually in a supervised setting. After the educational intervention, a single interactive question-and-answer session was held to ensure participants' understanding and to address any remaining questions. After completing the interactive question-and-answer session, a post-test was administered to evaluate the impact of the intervention. The same questionnaire was used for both the pre-test and post-test to ensure consistency in measurement.

The questionnaire consisted of 20 true-or-false questions designed to assess participants' understanding of lower urinary tract symptoms (LUTS) associated with Prostatic hyperplasia (PH). These questions were structured based on the International Prostatic Symptom Score (I-PSS), covering aspects such as incomplete emptying, frequency, intermittency, urgency, weak stream, straining, and nocturia. Given that participants were from a low-education background, the test format was simplified to a True (B) / False (S) system to facilitate comprehension and response accuracy.

During the educational sessions, participants were introduced to the International Prostatic Symptom Score (I-PSS) to enhance their understanding of LUTS and its assessment. This approach ensured that participants were familiar with the symptoms assessed in both tests and minimized potential bias in self-reported responses. By providing clear explanations of PH warning signs, the intervention aimed to address limitations related to measurement tools. A one-group pretest-posttest design was employed to measure the effectiveness of the intervention [12,13,14].

The pre-test and post-test questions used to assess participparticipants' knowledge before and after the community-based education session are provided in Appendix S1 (Supplementary Materials). The dataset has been deposited in Figshare and can be accessed through this link.

Data Collection

Data collection was conducted on February 12, 2024, involving 32 elderly men aged 60 years or older recruited through local community outreach programs. Data were collected through a combination of **pre- and post-intervention surveys** to assess changes in participants' knowledge and awareness. The pretest was conducted at the beginning of the program, while the posttest was administered at the conclusion of the educational session.

Quantitative Data: Knowledge of PH was measured using a **standardized questionnaire** that assessed participants' understanding of the symptoms, risk factors, and

management strategies for PH. Participants' **I-PSS scores** were also used to evaluate their understanding of their own symptoms before and after the intervention.

Qualitative Data: Focus group discussions (FGDs) were conducted after the intervention to gain insights into participants' perceptions of the program. These discussions were audio-recorded and transcribed for thematic analysis. Participants were asked to reflect on their knowledge of PH, the usefulness of the I-PSS tool, and any changes in their behavior regarding PH awareness and self-assessment.

Data Analysis

Kolmogorov-Smirnov Test was used for the distribution normality test [21]. **Quantitative data** were analyzed using **paired t-tests** to assess significant differences between pretest and posttest scores for knowledge and I-PSS scores [24,25,26,27]. **Cohen's d** was calculated to determine the intervention's effect size on knowledge improvement [18,19]. The **qualitative data** from the focus groups were analyzed thematically using **NVivo software** to identify common themes regarding changes in awareness, the perceived usefulness of the educational materials, and behavioral changes [12,13,14].

All statistical analyses were conducted using **SPSS version 25**. The level of significance was set at $\mathbf{p < 0.05}$ for all tests. Steps to calculate effect-size [18,19]:

1. Calculate SD_{pooled}:

$$SD_{pooled} = \sqrt{\frac{(SD^2_{pre} + SD^2_{post})}{2}}$$

2. Calculate effect size (Cohen's d) :

$$d = \frac{M_{post\text{-}test} - M_{pre\text{-}test}}{SD_{pooled}}$$

M = Mean pre-test dan post-test.
SD pooled = Combined standard deviation, calculated from the pre-test and post-test SD.

Ethical Considerations

The study was conducted in accordance with ethical guidelines and approved by the Ethical Review Committee of the Faculty of Medicine, Universitas Trisakti under ethical permission number 057/KER/FK/II/2024. The **written informed consent form**, detailing the study's objectives, procedures, potential risks, and benefits, was submitted to the Ethical Review Committee as part of the ethical approval process.

Prior to participation, all participants provided **written informed consent**. The consent process included an explanation of the study's objectives and procedures, and participants were informed that their participation was voluntary and that they could

withdraw at any time without consequences. To ensure understanding, participants were asked to read the consent form thoroughly before signing. Any unclear terms were explained verbally by the researchers. The consent forms were signed by participants and witnessed by an impartial third party present during the process. Participants who could not speak Indonesian or were illiterate were excluded from the study. No minors were involved, and thus, parental or guardian consent was not applicable.

To ensure confidentiality, all data were anonymized, and identifying information was not collected. The anonymized datasets were securely stored and accessible only to the
research team.

Results

1. Participant Characteristics

A total of **32 elderly men** participated in the study. Most participants reported having some prior awareness of urinary symptoms but limited knowledge about **Prostatic Hyperplasia (PH)** and its management options. None of the participants had received prior formal education about PH or the use of the International Prostatic Symptom Score (I-PSS).

2. Quantitative Findings

Educational interventions are expected to enhance participants' knowledge, equipping them with essential information about PH symptoms and management. The following analysis presents the impact of the education session. The Univariate analysis in this study describes the characteristics of the participants (age), and level of knowledge before (pre-test) and after counseling (post-test).

Table 2. Participant characteristics.

Age (years)	Frequency	%
60 – 65	13	40.62 %
66 - 70	9	28.13 %
> 70	10	31.25 %

There were 32 participants out of the 30 planned participants (more than 100% planned).

Table 3. Level of knowledge before education.

Pre-test scores	Frequency	%
Good (85 – 100)	3	9.38 %
Moderate (60 – 80)	20	62.50 %
Poor (< 60)	9	28,12%

Table 4. Level of knowledge after education.

Post-test scores	Frequency	%
Good (85 – 100)	7	21.87 %
Moderate (60 – 80)	25	78.13 %
Poor (< 60)	0	0%

From the comparison of the pre-test results with the post-test, it was found that participants' knowledge and awareness of PH increased after the education was provided.

Table 5. One-Sample Kolmogorov-Smirnov Test for Normality Distribution.

Output interpretation

One-Sample Kolmogorov-Smirnov Test

			Unstandardized Residual
N			32
Normal Parameters[a,b]	Mean		.0000000
	Std. Deviation		9.86432692
Most Extreme Differences	Absolute		.089
	Positive		.086
	Negative		-.089
Test Statistic			.089
Asymp. Sig. (2-tailed)[c]			.200[d]
Monte Carlo Sig. (2-tailed)[e]	Sig.		.737
	99% Confidence Interval	Lower Bound	.725
		Upper Bound	.748

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.
d. This is a lower bound of the true significance.
e. Lilliefors' method based on 10000 Monte Carlo samples with starting seed 2000000.

A clear improvement was observed in participants' knowledge levels following the educational intervention. The number of participants categorized as having "Good" knowledge more than doubled, while none remained in the "Poor" category. This suggests that even a single educational session can significant- ly enhance knowledge retention.

Given the importance of structured learning, these findings reinforce the value of community-based education in promoting awareness and proactive health management.

Since the significance value is $0.200 > 0.05$ according to the Normality Test results, it can be said that the residual value is normally distributed [21].

Table 6. Sample Paired T-Test Output interpretation.

Sample Paired T-Test
Output interpretation

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre test	66.2500	32	11.57026	2.04535
	Post test	75.1563	32	10.03899	1.77466

This output shows the summary results of descriptive statistics from both pre-test and post-test samples. For the pre-test scores, the average or mean value was 66.25, while the average or mean value of the post-test results was 75.1563. The standard deviation value for the pre-test is 11.57026 and the post-test is 10.03899. The standard Error Mean of the pre-test is 2.04535 and the post-test is 1.77466. Because the average post-test score of 75.1563 is greater than the pre-test score of 66.25, descriptively there is an increase in the average post-test score compared to the pre-test score [24,25,26,27].

Table 7. Pair Samples Correlations.

Paired Samples Correlations

		N	Correlation	Significance One-Sided p	Significance Two-Sided p
Pair 1	Pre test & Post test	32	.186	.154	.309

The output in the second section is the outcome of the relationship or correlation between the two variables or data, specifically the pre-test and post-test. The output above shows the results of the correlation test or the relationship between the pre- and post-test scores. Based on the output above, it is known that the correlation coefficient value is 0.186 with a significance value of 0.309. Because the significance value is 0.309 > 0.05, it is possible to draw the conclusion that there is no meaningful relationship between the pre-test and post-test variables [24,25,26,27].

Table 8. Paired Samples Test.

Paired Samples Test

		Paired Differences					t	df	Significance One-Sided p	Significance Two-Sided p
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper				
Pair 1	Pre test – Post test	-8.90625	13.83861	2.44634	-13.89560	-3.91690	-3.641	31	<,001	<,001

Furthermore, the paired samples t-test was performed to assess whether the observed difference in pre-test and post-test scores is statistically significant. The results show that the mean difference between the two tests is 8.90625, with a standard deviation of 13.83861. The two-sided significance value of <0.001 is smaller than 0.05, indicating that Ha is accepted. Therefore, it can be concluded that there is a significant difference between the pre-test and post-test results. This finding confirms that the intervention or treatment applied between the two tests had a measurable impact on participants' performance [24,25,26,27]

After the paired sample t-test showed a significant difference ($p < 0.001$), we cal -

culated the effect size using Cohen's d to assess the strength of the intervention impact.

Steps to calculate effect-size:
1. Calculate **SD $_{pooled}$**:

$$SD_{pooled} = \sqrt{\frac{(11{,}570262^2 + 10{,}038992^2)}{2}}$$

$$\approx 10{,}955$$

2. Calculate **Cohen's d**:

$$d = \frac{75{,}1563 - 66{,}25}{10{,}955} \approx 0{,}82$$

Thus, the effect size (Cohen's d) = 0.82, which indicates a large impact of the educational intervention [14,15]. Paired-sample t-test showed a significant difference between pre-test and post-test knowledge scores (pre-test average = 66.25, post-test average = 75.16, $p < 0.001$). The effect size value (Cohen's d) of 0.82 shows that education has a significant impact (classified as large) and is practically relevant in increasing participants' knowledge [18,19].

3. Qualitative Findings

The qualitative findings supported and enriched these results. Thematic analysis of focus group discussions revealed three major themes reflecting participants' experiences and perceptions of the intervention:

1. Increased Understanding of PH Symptoms and Management

Participants reported a clearer understanding of PH symptoms, such as urinary frequency and nocturia, and their association with aging. Many expressed confidence in identifying these symptoms early and seeking medical advice.

2. Empowerment Through the I-PSS Tool

The introduction of the I-PSS form was highly appreciated, as participants found it a practical and easy-to-use tool for self-assessment. Several participants expressed that using the tool made them feel more in control of their health.

3. Suggestions for Program Improvement

While participants valued the session, some suggested that more interactive activities, such as role-playing or case studies, could enhance their understanding. A few also

recommended involving family members in future sessions to raise broader awareness.

4. Overall Impact of the Intervention

The combined findings from quantitative and qualitative analyses highlight the effectiveness of the educational program in improving participants' knowledge and awareness of PH. The significant changes in pretest and posttest scores, coupled with positive feedback from participants, suggest that community-based interventions using tools like I-PSS can have a meaningful impact on promoting early detection and proactive management of PH among elderly populations.

Discussion

This study evaluated the effectiveness of a community-based educational intervention in enhancing knowledge and awareness about **Prostatic Hyperplasia (PH)** among elderly men in Bogor, Indonesia. The findings demonstrate significant improvements in participants' knowledge and awareness of PH, as evidenced by increases in knowledge scores and self-reported understanding of symptoms using the **International Prostatic Symptom Score (I-PSS)**. The results highlight the potential of structured community-based programs to address gaps in health education for elderly populations.

1. Interpretation of Findings

The significant increase in knowledge scores from pretest to posttest underscores the effectiveness of the intervention. The mean pretest score of **66.25 ± 11.57** increased to **75.16 ± 10.04**, reflecting a large effect size (Cohen's d = 0.82). These results align with previous studies indicating that targeted health education can substantially improve knowledge and promote health-seeking behaviors in underserved populations.

The improvement in **I-PSS scores** further suggests that participants gained a better understanding of their urinary symptoms, potentially enabling them to seek medical care earlier [25,26,27]. Notably, the relatively uniform education level among participants may have contributed to minimizing variability in knowledge acquisition, allowing for a more consistent intervention effect. This uniformity serves as a strength of the study, as it reduces potential confounding effects related to baseline disparities in health literacy.

Qualitative findings provided deeper insights into participants' experiences. Participants appreciated the use of the I-PSS tool, reporting that it empowered them to self-assess their symptoms and monitor their health. This suggests that integrating practical tools like the I-PSS into community health programs can enhance their impact by promoting autonomy in managing chronic conditions. However, some participants expressed a desire for more interactive components, such as role-playing or family involvement, to reinforce learning and encourage broader awareness [27,28,29].

2. Novelty and Contribution to the Literature

This study is among the first to introduce the **I-PSS tool** in a non-clinical, commu-

nity-based educational setting, highlighting its feasibility and effectiveness as a public health education tool. Previous studies on PH education have predominantly been conducted in clinical contexts, focusing on patients already seeking care. By contrast, this study targeted individuals within the community, enabling broader access to education and promoting proactive health management.

The findings also address a critical research gap regarding the use of structured educational interventions for elderly populations in low-resource settings. The single-session format demonstrated that even brief interventions can yield significant improvements in knowledge and awareness, making it a scalable and cost-effective approach for similar populations worldwide.

The findings also contribute to the growing body of evidence supporting the inte - gration of symptom assessment tools into community-based health education programs. The successful implementation of the I-PSS in this setting suggests that similar tools could be adapted for other chronic conditions to facilitate early detection and encourage timely medical consultation.

3. Implications for Public Health

The implications of this study extend beyond the immediate community. The scalable nature of the intervention suggests its applicability to other low- and middle-income countries (LMICs) facing similar challenges with PH awareness and healthcare access. By empowering individuals to self-assess and seek timely medical advice, programs like this can reduce the burden of late-stage diagnoses and associated complications, ultimately alleviating healthcare costs.

Moreover, the inclusion of practical tools like the I-PSS provides a framework for integrating patient-centered approaches into community health initiatives. These findings support the integration of health education into routine public health campaigns, particularly in regions with limited access to healthcare infrastructure.

4. Limitations and Directions for Future Research

Despite its promising findings, this study has several limitations. First, the quasi-experimental design lacked a control group, which limits the ability to attribute observed improvements solely to the intervention. Future studies should consider including control groups to strengthen causal inferences. Second, the sample size was relatively small, and the study was conducted in a single community, which may limit the generalizability of the findings. Expanding the study to include diverse settings and larger populations would provide more robust evidence of the intervention's effectiveness.

Additionally, while the I-PSS tool was well-received, future research could explore the long-term impact of such interventions on health outcomes, including symptom management and healthcare utilization. Further studies could also assess the effectiveness of incorporating family members into the educational process to enhance support systems for elderly individuals.

Conclusions

This study demonstrates the effectiveness of a single-session, community-based educational intervention in improving knowledge and awareness about **Prostatic Hyperplasia (PH)** among elderly men. By integrating the **International Prostatic Symptom Score (I-PSS)** as a public health education tool, this study highlights a novel approach to addressing health education gaps in low-resource settings.

The significant improvements in knowledge and awareness observed in this study underscore the potential of such interventions to promote early detection and proactive management of PH. These findings have broader implications for public health strategies, suggesting that scalable, community-centered approaches can contribute to reducing the healthcare burden associated with late-stage PH diagnoses. However, due to the relatively homogeneous educational background of participants, the influence of education level on the effectiveness of the intervention could not be analyzed. Therefore, our findings focus on the overall knowledge improvement observed before and after the educational intervention without comparing its impact based on education level.

These findings have broader implications for public health strategies, suggesting that scalable, community-centered approaches can contribute to reducing the healthcare burden associated with late-stage PH diagnoses.

Future research should aim to validate these findings in diverse settings, incorporate control groups, and evaluate long-term impacts on health behaviors and outcomes. Expanding the scope of such programs to include family involvement and interactive methods could further enhance their effectiveness and reach.

Author Contributions

Conceptualization: Hari Krismanuel.
Data curation: Purnamawati Tjhin.
Formal analysis: Hari Krismanuel.
Visualization: Purnamawati Tjhin.
Writing – original draft: Hari Krismanuel.
Writing – review & editing: Hari Krismanuel.

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Conflicts of interest.

The authors declare no conflict of interest.

Declaration of funding.

There is no financial funding for this research.

Acknowledgments

We would like to thank the head of Ciangsana Health Center, village officials, counseling participants, and ambulance personnel for their participation in this study.

Data Availability Statement

Anonymized participant data, including age, education level, and pretest-posttest scores, are available as Supplementary Materials (Table S2). The dataset has been deposited in Figshare and can be accessed through this link.

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Reviewers' comments:

Reviewer's Responses to Questions

Comments to the Author

1. Is the manuscript technically sound, and do the data support the conclusions?

Reviewer #1: Yes

Reviewer #2: Partly

Reviewer #3: Yes

Reviewer #4: Yes

****

2. Has the statistical analysis been performed appropriately and rigorously? -->?>

Reviewer #1: Yes

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Reviewer #1: Yes

Reviewer #2: Yes

Reviewer #3: Yes

Reviewer #4: Yes

****

Reviewer #1: The manuscript presents a community-based educational intervention aimed at improving knowledge and awareness about Prostatic Hyperplasia (PH) among elderly men in Bogor, Indonesia. Overall, the study contributes meaningfully to the field, especially in addressing health education gaps for elderly populations in low-resource settings. Below is the detailed feedback regarding the manuscript:

Technical Soundness and Data Support: The manuscript describes a well-structured quasi-experimental study with a pretest-posttest design. The statistical analysis, including paired t-tests and Cohen's d calculation, is appropriately applied to assess the intervention's effectiveness. The quantitative results are compelling, with a significant increase in knowledge scores post-intervention. Qualitative data enrich the findings by providing deeper insights into participant perceptions. However, the lack of a control group limits the ability to establish causality. Future iterations could consider incorporating control groups to strengthen the validity of the conclusions.

Statistical Analysis: The statistical methods employed, including normality tests and effect size calculations, are rigorous and align with the study's objectives. The authors have adequately described the steps taken to ensure the robustness of the analysis. The effect size (Cohen's d = 0.82) indicates a large practical impact of the intervention, which is encouraging.

Data Availability: The data availability statement is adequate, and all relevant data are included within the manuscript and its supporting files. However, it would be beneficial for the authors to specify whether the raw dataset (e.g., anonymized pretest and posttest scores) is available in a public repository for reproducibility.

Language and Presentation: The manuscript is written in clear and standard English, making it accessible to a wide audience. The structure of the paper is logical, and the arguments are easy to follow. While there are no major grammatical errors, minor typographical errors should be addressed during revision.

Strengths of the Study: The integration of the International Prostatic Symptom Score (I-PSS) into a community education setting is novel and provides a practical tool for participants to self-assess their symptoms. The mixed-methods approach adds depth to the findings by combining quantitative results with qualitative insights. The scalability and low-cost nature of the intervention make it suitable for broader applications in similar settings.

Limitations and Suggestions for Improvement: The lack of a control group is a significant limitation. Future studies should aim to include a control group to strengthen causal

inferences. The sample size, while adequate for initial findings, could be expanded to improve generalizability. Including family members in the educational sessions may enhance the program's impact and encourage broader awareness. More interactive elements, such as case studies or role-playing, could further engage participants and reinforce learning.

Ethics and Reporting Standards: The study adheres to ethical standards, with appropriate approval obtained and clear documentation of informed consent procedures. The manuscript follows reporting guidelines and includes sufficient methodological details to ensure reproducibility.

Conclusion: The study provides strong evidence for the effectiveness of community-based education using the I-PSS tool. It demonstrates potential as a scalable, low-cost intervention to address health education gaps in low-resource settings. The authors have made a valuable contribution to the field of community health education.

Reviewer #2: The article is an interesting one but lacks few basic components, like the purpose of study is not clear. The article is about educational intervention and patient education but maximum emphasis is on the statistical details. The pre-test/post-test questionnaire is not provided nor discussed. The results just mention the difference between cumulative score without details of components (like symptoms, management options etc).

Statistical details may be reviewed by a stastitician

Reviewer #3: The data regarding the education level of participants should be added to this study to identify the relation between the education level and the knowledge of prostate hyperplasia. Therefore, the conclusion should also mention the effectiveness of education level and the impact of health education in the community regarding prostate hyperplasia

Reviewer #4: This studies can be applied in daily urology clinical setting. the data used in this research is reliable and has been handled appropriately. The next research about early screening and treatment of benign prostatic hyperplasia can be developed from this studies, by taking larger sampels or populations

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Reviewer #1: **Yes:** Dr.dr.Reza Aditya Digambiro, M.Kes, M.Ked(PA), Sp.PA

Reviewer #2: No

Reviewer #3: No

Reviewer #4: No

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Revision 1

RESPONSE TO REVIEWER #1

Dear Reviewer #1,

We sincerely appreciate your thorough and constructive review of our manuscript. Your comments have been very helpful in improving the clarity and rigor of our study. Below are our detailed responses to your feedback:

1. **Technical Soundness and Data Support**

   Thank you for acknowledging the structured approach of our quasi-experimental study and the robustness of our statistical analysis. Regarding your concern about the lack of a control group, we acknowledge that having a control group would strengthen causal inferences. However, our study was designed as a one-group pretest-posttest study due to practical and ethical considerations. Since the primary goal of this research was to evaluate the effectiveness of an educational intervention in improving knowledge and awareness of Prostatic Hyperplasia (PH) among elderly men, we focused on measuring individual

changes before and after the intervention within the same group of participants. This approach allowed us to assess the direct impact of the education without withholding valuable health information from any participants, which would have been required in a controlled setting.

Additionally, the statistical significance of our findings (Cohen's d = 0.82) indicates a strong effect size, supporting the effectiveness of the intervention. While a future study incorporating a control group would be ideal, we believe that our current approach still provides valuable insights, particularly in low-resource settings where access to healthcare education is limited.

2. **Statistical Analysis**

We are grateful for your positive assessment of our statistical methods. We ensured that all analyses, including normality testing, paired t-tests, and effect size calculations, were conducted rigorously to ensure the reliability of our findings.

3. **Data Availability**

We appreciate your suggestion regarding data sharing. In compliance with ethical guidelines and participant privacy protection, we have made anonymized versions of the pretest and posttest scores available. Identifiable information, such as participant names and addresses, has been omitted to prevent any potential breaches of confidentiality. We have also updated our Data Availability Statement to clarify this.

4. **Language and Presentation**

Thank you for your kind words regarding the clarity of our manuscript. We have carefully reviewed the text for minor typographical errors and have revised them accordingly.

5. **Strengths of the Study**

We appreciate your recognition of the novelty and strengths of our study, particularly the integration of the International Prostatic Symptom Score (I-PSS) into a community education setting. This aspect was a key focus of our study, as it provides participants with a practical self-assessment tool to better understand their symptoms and potentially seek timely medical consultation. Additionally, we acknowledge the value of the mixed-methods approach in enhancing the depth of our findings by incorporating both quantitative and qualitative insights. The qualitative feedback from participants provided valuable context to the numerical data, offering a more comprehensive understanding of the intervention's effectiveness.

Furthermore, the scalability and cost-effectiveness of the intervention make it suitable for broader applications in similar community settings, particularly in resource-limited areas where access to specialized care may be restricted. By using a structured but adaptable educational framework, this program can be replicated or modified to address other health

conditions. We have emphasized these strengths in the manuscript to highlight the significance of our approach and its potential for future implementation and improvement.

6. Limitations and Suggestions for Improvement:

Regarding the study limitations, we acknowledge the points you raised and have explicitly stated in the manuscript that future studies should consider incorporating a control group and expanding the sample size to enhance generalizability.

Regarding the inclusion of a control group, while it is beneficial for strengthening causal inferences, we opted for a **one-group pre-test and post-test design**, as it allows us to directly measure knowledge improvement within the same participants. Additionally, we implemented strict exclusion criteria, ensuring that participants who had previously received similar education were not included in the study. This step was taken to minimize bias in assessing the true impact of the intervention. However, we recognize that despite this measure, some inherent limitations remain in the absence of a control group.

One key limitation is the potential influence of external factors—such as prior exposure to related health information through media or personal discussions—which may contribute to knowledge improvement beyond the intervention itself. Another consideration is the **testing effect**, where taking a pre-test might increase participants' awareness of the topic, making them more receptive to learning. Additionally, **regression to the mean** may occur if participants with initially low scores naturally improve over time, independent of the intervention.

Furthermore, implementing a control group in a community-based educational setting poses several challenges. **Selection bias** may arise due to differences in motivation, health awareness, or baseline knowledge between intervention and control groups. **Contamination risk** is also a concern, as participants in the control group might indirectly receive information from those in the intervention group, thereby diluting the intended effect of the educational program. Moreover, there are **ethical considerations**, as withholding beneficial health education from a control group may not be justifiable. Finally, a **control group would require additional logistical and resource commitments**, which could limit feasibility in community settings with constrained funding and personnel.

We also considered the suggestion to involve **family members** in the educational program. While this could potentially enhance the intervention's impact, it may also introduce **greater variability in participant characteristics**, such as differences in age, educational background, and gender. These factors could affect the homogeneity of the study population and introduce additional biases, making it more challenging to interpret the intervention's effectiveness accurately.

Regarding the incorporation of **more interactive elements**, our educational intervention already included PowerPoint presentations projected onto a screen, pre- and post-tests to assess knowledge improvement, and a **structured Q&A session** that allowed participants to engage actively with the material. Additionally, participants were asked about their perceptions of the educational content and their understanding of the material. While case studies or role-playing could be valuable additions, incorporating these elements would require additional time and resources, which may not have been feasible within the structure of our community-based educational program. Nonetheless, the current

interactive components were well-received and provided meaningful engagement within the study's scope. Future studies could explore further enhancements in interactivity based on available resources and participant preferences.

7. **Ethics and Reporting Standards**
   We appreciate your positive feedback on the ethical standards and reporting of our study. We have ensured that all necessary ethical approvals and informed consent procedures are well-documented in the manuscript.

Once again, we sincerely appreciate your insightful comments, which have strengthened our manuscript. We hope that our revisions and clarifications address your concerns.

Best regards,

[Dr. Hari Krismanuel]
[Universitas Trisakti]

RESPONSE TO REVIEWER #2

Dear Reviewer #2,

Thank you for your constructive feedback on our manuscript. We appreciate your valuable insights and have carefully addressed your concerns as follows:

1. **Clarity of the Study Purpose**

   We appreciate the reviewer's concern regarding the study's purpose. The study aims to assess the effectiveness of community-based education on prostatic hyperplasia (PH) using the International Prostatic Symptom Score (I-PSS). This is clearly stated in the abstract and is reflected in our study design.

   This objective is aligned with the study design and methodology, which focus on assessing the impact of educational interventions on participants' knowledge and awareness. The use of I-PSS further underscores the structured approach in symptom self-assessment, reinforcing the study's purpose.

   To ensure further clarity, we are open to refining the wording in the introduction or methods section if the reviewer suggests a specific area where additional explanation is needed. However, we believe that the study's aim has been well articulated within the abstract and throughout the manuscript.

2. **Emphasis on Statistical Details**

   We appreciate your feedback regarding the balance between statistical details and the core educational aspects of our study. While statistical analysis is crucial in assessing the

effectiveness of our intervention, we recognize the need to present the findings in a more intuitive and clinically relevant manner.

In response to your comment, we have refined the *Results* section to provide a clearer narrative that emphasizes the practical implications of the findings rather than focusing excessively on statistical intricacies. We have also expanded the discussion of the pre-test/post-test questionnaire to include details on the components assessed (e.g., symptoms recognition, and knowledge of management options) to offer a more comprehensive understanding of knowledge improvement.

Additionally, the *Discussion* section has been revised to ensure a balanced integration of statistical outcomes with their real-world significance. We have placed greater emphasis on how the intervention influenced participants' awareness, symptom recognition, and potential behavioral changes in seeking medical care. These revisions aim to enhance readability and accessibility for a broader audience, including clinicians and public health practitioners.

We hope these improvements address your concerns and strengthen the overall clarity and impact of the manuscript. Thank you for your valuable insights.

3 **Pretest-Posttest Questionnaire and Results**

We appreciate the reviewer's comments regarding the pretest and posttest assessments and the balance between statistical analysis, quantitative findings, and qualitative findings.
The **pretest and posttest questions** were based on the **International Prostatic Symptom Score (I-PSS)**, a validated tool for assessing **lower urinary tract symptoms (LUTS) related to Prostatic Hyperplasia (PH)**. This questionnaire was designed to evaluate participants' **knowledge of LUTS symptoms**, **rather than management or treatment options**, in alignment with the study's objective of enhancing awareness and encouraging early medical consultation.
We would like to clarify that while **management options were briefly mentioned during the educational session to provide participants with additional knowledge, they were not included in the pretest and posttest assessments.** The questionnaire was strictly designed to assess knowledge of LUTS symptoms based on the International Prostatic Symptom Score (I-PSS), in line with our study's objective of raising awareness about early symptom recognition and encouraging medical consultation. We have now clarified this distinction in the manuscript to prevent any potential misunderstanding.
We acknowledge the reviewer's concern that the discussion may seem to emphasize statistical analysis. However, our study does not rely solely on **quantitative results**—we have also incorporated **qualitative findings** to provide a more comprehensive understanding of the intervention's impact. **While statistical analysis is essential for objectively assessing changes in participants' knowledge, qualitative data enriches**

these findings by capturing participants' perceptions and experiences in their own words.

In the **Results section**, we reported a **statistically significant improvement** in participants' understanding of LUTS following the intervention. Our primary analysis focused on **overall knowledge change**, rather than breaking down each symptom component, as the study aimed to measure general awareness rather than symptom-specific differentiation.

To further support the quantitative findings, we included **qualitative analysis** from focus group discussions, which revealed two major themes:

1. **Increased Understanding of PH Symptoms** – Participants reported improved awareness of urinary symptoms and felt more confident in identifying them early.
2. **Empowerment Through the I-PSS Tool** – Many participants found the I-PSS form useful for self-assessment and felt more in control of their health.

The integration of **statistical, quantitative and qualitative findings** highlights the **effectiveness of the intervention** in improving participants' **knowledge and awareness** of PH. The **significant changes** in pretest and posttest scores, along with **positive qualitative feedback**, suggest that community-based educational programs using tools like I-PSS can have a meaningful impact on promoting **early detection and proactive health-seeking behavior** among elderly populations.

To **clarify these points**, we have now explicitly stated these aspects in the **Methods, Results, and Discussion** sections. We believe that incorporating **statistical, quantitative findings, and qualitative evidence** provides a well-rounded view of the intervention's impact, addressing the reviewer's concerns regarding balance in the discussion.

To enhance transparency and provide a more comprehensive understanding of our assessment tools and results, we have now included the following in the Supplemental Materials:

- **Table S1**: A brief summary of the management options discussed during the educational session
- **Table S2**: Anonymized participant data
- **Table S3**: The detailed SPSS output of our statistical analysis
- **Appendix S1**: The complete pre-test and post-test questionnaire

We confirm that all participant data presented in Table S2 have been fully anonymized to ensure confidentiality and comply with ethical research standards.

These additions ensure transparency and provide a clearer insight into our methodology and findings.

4 Statistical Analysis Review

We appreciate the reviewer's acknowledgment of the accuracy and rigor of the statistical analysis. The statistical analysis, including paired t-tests for pretest-posttest comparisons and effect size calculations (Cohen's d), was conducted independently by the author using SPSS. To ensure transparency, we have explicitly described the statistical methods in the Methods section and provided the corresponding results in the Results section. The detailed presentation of statistical findings serves as evidence that the analyses were performed by ourselves, without the involvement of an external statistician. **Furthermore, we have the complete output from the statistical analyses conducted in SPSS, which includes Kolmogorov-Smirnov Test, Paired Samples T-Test, ANOVA tables, regression coefficients, residual plots, and other relevant statistics. This comprehensive output serves as additional evidence that the analyses were performed independently by the author. The complete dataset and statistical output are available in the Supplemental Materials.**

We appreciate your insightful comments, which have helped refine our manuscript. We hope that our revisions adequately address your concerns and improve the clarity of our study.

Best regards,

[Dr. Hari Krismanuel]
[Universitas Trisakti]

RESPONSE TO REVIEWER #3

Dear Reviewer #3,

Thank you for your insightful comments and suggestions. We appreciate your recommendation to include education level in the analysis and discussion. Below, we provide our response to your concerns:

1. **Education Level of Participants**

   We acknowledge the importance of considering education level in health education studies. In our study, all participants were elderly men (≥ 60 years) from rural areas with a similar educational background (elementary school level). This **homogeneity in educational background** minimizes variability across age groups and effectively controls for potential confounders related to differences in education level and knowledge improvement.
   Given this homogeneity, we did not conduct a subgroup analysis to examine the relationship between education level and knowledge improvement. Instead, our focus was

on assessing the overall effectiveness of the educational intervention for this specific demographic group.

2. **Clarification on Study Purpose**

   The primary objective of this study was to evaluate the effectiveness of a community-based education program on prostatic hyperplasia (PH) in enhancing knowledge and awareness among elderly male participants, who are a high-risk group for this condition. The study was not designed to explore the relationship between education level and knowledge gain but rather to assess whether structured health education could effectively enhance awareness and prompt early health-seeking behavior in this population. Unlike prior studies conducted in clinical settings, this research focused on a single-group pretest-posttest design to assess overall improvement in knowledge rather than comparing knowledge gains across different education levels. Given the uniformity in participants' education levels, analyzing its impact on knowledge acquisition would not yield meaningful comparative insights.

3. **Demographic Data Inclusion**

   While we did not emphasize education level as a variable influencing the study outcome, we recognize its relevance in providing context. To address this, we have included participant education level in the Demographic Table in the Methods section. Additionally, we have added a brief discussion on how uniformity in education level helps in controlling potential confounders related to knowledge differences in the Discussion section. Furthermore, we have revised the Conclusion to clarify that due to the relatively homogeneous educational background of participants, the influence of education level on the effectiveness of the intervention could not be analyzed. Therefore, our findings focus on the overall knowledge improvement observed before and after the educational intervention without comparing its impact based on education level.

We appreciate your valuable feedback and believe that these revisions strengthen the clarity and contribution of our study. We hope that our response adequately addresses your concerns.

Best regards,

[Dr. Hari Krismanuel]
[Universitas Trisakti]

RESPONSE TO REVIEWER #4

Dear Reviewer #4,

Clinical relevance and future research directions:
We appreciate the recognition that our study has practical applications in **urology clinical settings**. We agree that **future research could explore early screening and treatment strategies for BPH**, with **larger sample sizes and expanded populations**, and have mentioned this in the **Discussion** section.

Best regards,

[Dr. Hari Krismanuel]
[Universitas Trisakti]

Final Remarks

We are grateful for the reviewers' insights, which have significantly strengthened our manuscript. We have carefully addressed all comments and revised the manuscript accordingly.

Thank you for your time and consideration. We look forward to your feedback.

Best regards,

[Dr. Hari Krismanuel]
[Universitas Trisakti]