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# EFFECT OF A COMBINATION OF ANTI-TUBERCULOSIS DRUGS (ATTS) AND PUMPKIN SEED CAPSULES ON SPUTUM BACTERIAL LOAD AMONG TB PATIENTS IN MAJENE REGENCY, INDONESIA

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## ABSTRACT

Tuberculosis remains a major public health challenge globally, particularly in low- and middle-income countries where the disease exhibits high prevalence and mortality. Despite the global implementation of standardized anti-tuberculosis drug regimens, therapeutic outcomes are often limited by treatment non-adherence, prolonged duration, and the emergence of multidrug-resistant strains. As a response, there is growing interest in integrating functional food-based interventions into tuberculosis treatment protocols. Pumpkin seeds (Cucurbita moschata), known for their bioactive compounds including zinc, polyphenols, and flavonoids, have demonstrated antimicrobial, immunomodulatory, and antioxidant properties, offering potential as a supportive adjunct in tuberculosis therapy. This study aimed to examine the effectiveness of combining anti-tuberculosis drugs with pumpkin seed capsule supplementation in reducing the bacterial load of Mycobacterium tuberculosis in sputum samples of patients diagnosed with tuberculosis in Majene Regency, Indonesia. A quasi-experimental design was applied, utilizing a non-randomized pre-test and post-test control group methodology. A total of 57 tuberculosis patients were selected using purposive sampling, with 28 participants assigned to the intervention group receiving standard anti-tuberculosis drugs alongside 700 mg of pumpkin seed capsules administered twice daily for 90 days. The remaining 29 participants served as the control group and received only the standard drug regimen. Sputum samples were collected and analyzed at baseline, one month, and three months using the polymerase chain reaction method to determine bacterial load. Data were statistically evaluated using paired t-tests, independent t-tests, and chi-square tests, with a confidence interval set at 95 percent. The intervention group exhibited a significant decrease in mean bacterial count from 110.8 to 0.0 colony-forming units after three months, while the control group showed a modest decline to 0.6. Additionally, by the end of the first month, 61.29 percent of the intervention group had negative sputum conversion compared to 38.71 percent in the control group, indicating a statistically significant improvement in bacterial clearance. The findings suggest that pumpkin seed supplementation may effectively support faster recovery in tuberculosis patients when used in conjunction with anti-tuberculosis drugs. The integration of pumpkin seed capsules into therapeutic protocols offers a promising functional food-based strategy to enhance bacterial eradication and shorten treatment duration. Further longitudinal studies are required to investigate long-term safety, optimal dosing, and the mechanistic pathways contributing to this therapeutic synergy.

**Key words:** Anti-Tuberculosis Drugs, Capsules, Food, Functional, Mycobacterium, Pumpkin, Seed, Sputum, Tuberculosis

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## INTRODUCTION

The global burden of tuberculosis (TB) has reached its highest level since 1995, with 7.5 million cases diagnosed in 2022. This figure represents a significant increase from 5.8 million cases in 2020 and 6.4 million cases in 2021 [1]. An estimated 1.3 million deaths worldwide were attributed to tuberculosis. Although mortality related to the disease declined between 2015 and 2022, the World Health Organization's target of reducing tuberculosis deaths by 75 percent by 2025 remains far from being achieved

In Indonesia, TB incidence rose by 18% in 2021 [2]. The Indonesian government has committed to reducing the incidence rate to 65 cases per 100,000 population by 2030 [3]. West Sulawesi Province has experienced a sharp increase in TB cases, rising from 2,306 cases in 2021 to 3,360 cases in 2023. Similarly, in Majene Regency, TB cases increased from 461 to 582 within the same period. Fluctuations in TB-related mortality in this region highlight the urgent need for more intensive efforts in disease management and prevention [3].

As a major global health challenge, the disease continues to affect millions, with a substantial number of patients failing to achieve a cure—contributing to high transmission rates and increasing drug resistance [4]. Among infectious diseases, this condition represents a significant public health concern, particularly in low- and middle-income countries. Although documented throughout various historical periods, the disease continues to pose a major health challenge today [5]. Beyond its direct impact on individuals, the disease also affects their families, contributing to psychological distress, decreased social support, and reduced self-confidence [6]. The role of environmental factors in the transmission and progression of Mycobacterium tuberculosis infection remains unclear and requires further investigation [7].

Prompt identification and effective treatment of the disease are critical for controlling its spread and reducing incidence rates [8]. It remains an important and urgent public health issue that demands comprehensive attention. Further research is essential to identify effective and efficient solutions [9]

Despite significant advancements in the prevention and treatment of pulmonary tuberculosis (PTB) under the guidance of the World Health Organization (WHO), the disease remains widespread and challenging to manage. This is primarily due to high transmission rates, increasing drug resistance, prolonged treatment regimens, delayed healthcare access, and poor adherence to therapy [10].

The complexity of TB treatment is further exacerbated by economic and social factors, which can strain healthcare infrastructure and heighten population vulnerability. Although considerable progress has been made in TB treatment,


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emerging challenges, particularly drug resistance, continue to pose significant threats to therapeutic success [11].

The growing interest in traditional and herbal medicines, including pumpkin seeds, reflects a potential complementary approach to TB treatment [12]. These seeds (Cucurbita moschata) are rich in essential nutrients such as zinc, magnesium, and essential fatty acids, offering significant health benefits [13]. Studies indicate that pumpkin seeds possess immunomodulatory properties and antioxidant effects, which may contribute to TB treatment.

Pumpkin seeds (Cucurbita spp.) demonstrated potential as antimicrobial agents. Various studies have confirmed this property. Pumpkin seeds exhibited strong inhibitory effects against the growth of pathogenic bacteria, such as *Staphylococcus aureus* [14]. Moreover, pumpkin seeds showed the highest efficacy compared to other seeds in inhibiting the growth of *Enterobacter cloacae* and *Escherichia coli* [15].

The overall objective is to evaluate the effectiveness of combining ATT with pumpkin seed capsules in reducing bacterial load among TB patients. The specific objectives include: (1) comparing the rate of bacterial reduction at one, two, and three months between the intervention and control groups, and (2) assessing the adherence and tolerability of pumpkin seed capsule supplementation.

## MATERIAL AND METHODS

### Subject and Study design

This study employs a quasi-experimental design with a non-randomized pre-test and post-test control group approach. Participants are assigned to one of two groups: The intervention group which receives standard anti-tuberculosis therapy (ATT) combined with pumpkin seed capsules (700 mg/capsule) administered twice daily, and the control group receives only ATT. The study is conducted among outpatient TB patients in Majene Regency, specifically in Banggae 1 Health Center, Banggae 2 Health Center, Lembang Health Center, and Totoli Health Center.

The sample size was determined using a hypothesis test formula for two means, comparing the average bacterial count in the sputum of TB patients between the intervention and control groups. A total of 57 participants were included in the study: 28 in the intervention group and 29 in the control group. Participants were recruited using purposive sampling, based on predefined inclusion and exclusion criteria. To minimize selection bias in this non-randomized design, participants were matched as closely as possible based on key baseline characteristics, such as age, sex, and baseline sputum bacterial count. Eligible participants were sequentially assigned to the intervention or control group based on availability and willingness to participate, while ensuring that group characteristics remained comparable.

The Inclusion criteria included: (1) newly diagnosed TB patients confirmed through positive sputum examination, (2) willingness to consume pumpkin seed capsules daily for 90 days, and (3) aged over 12 years. Exclusion criteria included: allergy to pumpkin seeds, history of chronic diseases, pregnancy, or co-infection with HIV. Dropout criteria included: (1) failure to complete all phases of the study, (2) non-compliance with capsule consumption (<80%), (3) severe adverse effects (nausea, vomiting, constipation, persistent diarrhea), and (4) participants relocating during the study period. Baseline data for both groups were analyzed to assess comparability, and any significant differences were statistically controlled in the analysis to reduce bias and improve generalizability.

**Data Collection**

Data collection involved assessing bacterial load through-sputum examination using the polymerase chain reaction (PCR). Samples were collected at four time points:baseline (before the intervention), and follow-up assessments at 30, 60, and 90 days. The aim was to assess bacterial count over the intervention period.

During the intervention, researchers monitored compliance and symptoms via WhatsApp groups and conducted periodic re-examinations at the designated intervals. If the respondent experiences complaints, the researcher conducts further examination whether the complaint is related to the consumption of pumpkin seed capsules. However, during the consumption of pumpkin seed capsules, there were no significant complaints from respondents that needed to be treated at a community health center or a doctor who had been prepared by the researcher.

Upon obtaining informed consent, eligible participants were assigned to either the intervention or control group. The intervention group received 700 mg pumpkin seed capsules (two capsules daily) for 90 consecutive days (a total of 180 capsules). The control group followed the standard TB treatment regimen with ATT as prescribed by healthcare providers.

To ensure adherence, eligible participants in the intervention group were provided with a consumption tracking card, to record o record each dose taken. Compliance and symptoms monitoring was conducted daily via WhatsApp groups, supplemented with in-person follow-ups on a weekly basis. Participants reporting any adverse symptoms were referred to the nearest health center for clinical evaluation and management.

Bacterial count in sputum was re-evaluated at health facilities on days 30 and 60. For participants who failed to attend scheduled follow-ups, researchers conducted home visits to encourage participation in the final examination. A post test sputum examination was done On day 90 to assess changes in bacterial following the intervention.

### Statistical Analysis

Data were analyzed using both univariate and bivariate statistical methods. Univariate analysis was conducted to obtain frequency distributions of each variable, while bivariate analysis assessed the relationship between independent and dependent variables, beginning with a normality test. The Paired T-Test was used to compare differences in mean bacterial count between the intervention and control groups. A significance level was set at $\alpha = 0.05$.

### Ethical Considerations

This study was conducted in accordance with ethical guidelines for human research, and was approved by the Health Research Ethics Committee of Hasanuddin University, Makassar (Approval Number: 1791/UN4.14.1/TP.01.02/2024). All participants were provided with detailed information about the study and gave written informed consent prior to their participation, in accordance with the Declaration of Helsinki.

## RESULTS AND DISCUSSION

### Characteristics of the Subjects

The study analyzed five demographic variables: age, gender, education, occupation, and family history of tuberculosis (TB). As presented in Table 1, the intervention group consisted of 28 respondents, with the majority aged 41–60 years (57.14%). In contrast, the control group comprising of 29 participants exhibited a more evenly distributed age range. However, this difference was not statistically significant ($p = 0.219$).

Gender distribution differed significantly between groups, the intervention group was predominantly male (64.29%), whereas the control group had a higher proportion of female participants (65.52%),($p = 0.024$). In terms of education level, the proportion of respondents with low education was higher in the control group (51.72%) compared to the intervention group. but this difference was not significant ($p = 0.503$).

Regarding occupation, 57.14% of respondents in the intervention group were employed compared to 44.83% in the control group, but this difference was not statistically significant ($p = 0.352$). Similarly, the family history of TB was reported in 32.14% of respondents in the intervention group and 27.59% in the control group, with no significant difference observed ($p = 0.707$).

These findings suggest that age, education level, occupation, and family history of TB were evenly distributed between groups, ensuring comparability. However, the gender variable showed a significant difference, indicating a potential influence of gender on participation in the study.

Mycobacterium tuberculosis can remain dormant in the body for years, with the potential to reactivate and cause disease. These bacteria are aerobic, requiring oxygen for metabolism, and preferentially inhabit oxygen-rich lung tissues, particularly the apical regions, which are characterized by higher pressure [16].

**Compliance with Consuming Pumpkin Seed Capsules**

The adherence to the Pumpkin Seed Capsules is presented in Table 2. In the intervention group, all participants (100%) demonstrated high adherence, achieving a compliance score of more than 80%. This suggests that the intervention successfully ensured participant compliance. Similarly, in the control group consisting of 29 participants, 100% also achieved a compliance score above 80%, indicating no cases of non-compliance.

The present study demonstrated excellent adherence to the nutritional intervention involving pumpkin seed capsules, with 100% of participants in both the intervention and control groups achieving a compliance score exceeding 80%. This high level of adherence indicates that the intervention was well accepted and easily integrated into participants' daily routines. In the context of nutritional interventions, adherence is a crucial determinant of effectiveness, as insufficient compliance can significantly distort the assessment of intervention outcomes.

The success in maintaining full adherence may be attributed to several supporting factors, including clear instructions provided at the beginning of the intervention, regular follow-up and monitoring, and the absence of notable side effects commonly reported in capsule-based supplementation. Moreover, the palatability and small dosage of the pumpkin seed capsules likely contributed to participant compliance. These findings underscore the practicality of using pumpkin seed capsules as a supplemental intervention in nutritional programs targeting specific health outcomes.

**Effect of Pumpkin Seed Extract Administration on the Number of Tuberculosis Bacteria**

The impact of pumpkin seed extract on the bacterial load of *Mycobacterium tuberculosis*, assessed using PCR testing, is summarized in Table 3. At baseline, the intervention group had an average bacterial count of 110.82, while the control group had 98.44. All samples were confirmed positive for TB. The T-test showed no significant difference between the groups at baseline ( p= 0.3648).

By the end of the first month, the bacterial count decreased to 19.60 in the intervention group and 26.72 in the control group (p= 0.7012), suggesting no significant difference. By the second month, the bacterial count further declined to 0.607 in the intervention group and 2.06 in the control group(p= 0.8148), indicating no significant difference. In the third month, no bacteria were detected in the intervention group, while the control group had an average bacterial count of 0.62,

( p=0.8371). Across all time points, the difference between the two groups remained statistically insignificant.

Table 3 further illustrates the changes in PCR values at various time points. At baseline, the intervention group had a mean PCR score of 110.82 (SD = 151.90), while the control group had 98.45 (SD = 114.99), with a p-value of 0.368, indicating no significant difference. After the first month, the intervention group's PCR score decreased to 19.61 (SD = 48.40), while the control group had 26.72 (SD = 52.62), with a p-value of 0.701, showing no significant difference in early treatment response.

At the second month, the PCR value in the intervention group further declined to 0.61 (SD = 3.21), while the control group had 2.07 (SD = 7.96), with a p-value of 0.814, indicating no significant variation. By the third month, no bacteria were detected in the intervention group (PCR = 0), whereas the control group recorded an average PCR score of 0.62 (SD = 3.34), with a p-value of 0.837, confirming that the difference remained statistically insignificant.

Several factors can influence microscopic test results, including sample quality, bacterial load, slide preparation quality, staining technique, and examiner proficiency. The sensitivity of microscopic examination is significantly affected when the bacterial count is below 10,000 bacteria/mL in the sputum sample [14].

In the intervention group, the mean bacterial count before the intervention was recorded at 110.8 with a standard deviation (SD) of 151.8, indicating high variability in the initial data. Following the intervention, there was a significant reduction, with the mean bacterial count decreasing to 0.0 and SD 0.0, suggesting the intervention's high efficacy. Conversely, the control group exhibited a pre-intervention mean bacterial count of 98.4 (SD 114.9), which only slightly decreased to 0.6 (SD 3.3) post-observation. Despite the decline, this reduction was not as pronounced as in the intervention group. Statistical analysis yielded a highly significant p-value (<0.001) for both groups, highlighting a substantial difference between pre- and post-intervention conditions.

Table 4 presents the results of polymerase chain reaction (PCR) analysis of the patients' sputum samples. At baseline, all samples tested positive, with 28 patients in the intervention group and 29 in the control group. After one month of treatment

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with the combination therapy, a significant proportion of patients in the intervention group tested negative. Specifically, 19 patients (61.29%) in the intervention group achieved negative PCR results, compared to only 12 patients (38.71%) in the control group. Statistical analysis demonstrated a significant association between the combination therapy and bacterial count reduction, with a p-value of 0.045 and a risk ratio of 2.710.

By the second and third months, a greater number of patients in both groups had recovered. At the third-month evaluation, all patients in the intervention group tested negative for TB bacteria. However, the p-values for the second and third months were 0.574 and 0.322, respectively, indicating no significant difference between the combination therapy and ATT alone in reducing bacterial load in TB patients' sputum.

Table 3 compares PCR values between the intervention and control groups across different measurement periods. At baseline, both groups exhibited similar PCR values, with no significant difference between them. Subsequent measurements revealed a decline in PCR values in both groups; however, the intervention group demonstrated a greater reduction. Despite this trend, statistical analysis confirmed that the differences remained statistically insignificant across all measurement periods. This suggests that the observed changes in PCR values between the two groups were not substantial enough to be considered statistically significant.

Overall, while the intervention group exhibited a downward trend in PCR values, further investigation is warranted to explore other contributing factors and assess potential long-term benefits of the combination therapy. Factors influencing microscopic results include sample quality and bacterial load. The sensitivity of the examination may be compromised if the bacterial count in the sputum sample is below 10,000 CFU/mL [14].

The implementation of the Directly Observed Treatment Short-course (DOTS) program for TB control remains suboptimal, as patient non-adherence to treatment frequently results in discontinuation before completion. Side effects such as nausea and dizziness contribute to this issue, increasing the prevalence of multidrug-resistant TB (MDR-TB). To address these challenges, the exploration of natural supplements such as pumpkin seed capsules, which possess antimicrobial properties and inhibit Mycobacterium tuberculosis growth, is crucial.

Analysis within the intervention group revealed high variability in bacterial counts before treatment. After the intervention, the mean bacterial count declined sharply, indicating the treatment's significant impact. In contrast, the control group exhibited lower variability before the intervention, and its mean bacterial count decreased only

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marginally over the same period, reinforcing the superiority of the intervention's efficacy.

Further statistical analysis demonstrated a highly significant difference between pre- and post-intervention conditions in both groups, affirming the effectiveness of the intervention. The therapeutic benefits of pumpkin seed capsules may be attributed to their antimicrobial, antifungal, and antiviral properties [17].

Additionally, vitamin A and zinc play crucial roles in immune function, particularly in B and T cell development, mucosal epithelium maintenance, and antibody responses, which aid bacterial clearance. Zinc supplementation has been shown to significantly reduce bacterial load, as zinc-deficient individuals experience diminished thymulin levels, leading to impaired T cell-mediated immunity and heightened susceptibility to infections [18]. Essential micronutrients such as calcium (Ca), zinc (Zn), and iron (Fe) are vital for numerous biological processes [19 -21]. Furthermore, pumpkin seeds contain essential amino acids that support metabolic function and immunity [20].

Table 4 further illustrates the significant difference between the intervention group, which received the combination therapy, and the control group, which received ATT alone. At baseline, all patients in both groups tested positive, indicating a high bacterial load. After one month of intervention, the intervention group exhibited a marked improvement, with a higher proportion of patients achieving negative PCR results compared to the control group. These findings emphasize the potential of pumpkin seed supplementation as an adjunct therapy for TB treatment to enhance conventional treatment efficacy.

Despite the promising results observed in the early phase, the second- and third-month evaluations revealed no significant differences between the two groups. This suggests that while the combination therapy demonstrated an initial benefit, its long-term efficacy remains uncertain. Variability in individual treatment responses necessitates further research to elucidate the long-term therapeutic potential of pumpkin seed capsules in TB management.

A significant reduction in bacterial load was observed during the first month. However, the limited sample size at subsequent evaluations may have influenced the statistical outcomes. Adequate sample size is essential to ensure robust statistical power, as insufficient sample numbers can lead to inconsistent findings [22].

Furthermore, treatment adherence plays a critical role in recovery. This study reported 100% adherence in both the intervention and control groups, indicating a high level of commitment to treatment. Medication adherence, a key determinant of therapeutic success, is influenced by behavioral modifications [23]. Respondents consistently consumed both pumpkin seed capsules and ATT, driven by the primary motivation to recover and resume normal activities. Awareness of disease severity and treatment benefits also contributes to adherence rates. High adherence rates reflect a positive attitude towards treatment, further supported by the role of treatment monitoring officers and health education initiatives [24,25].

The content of oleic acid ester of hydroxy oleic acid (OAHOA) in yellow pumpkin seeds was found to exhibit anti-inflammatory properties by reducing the levels of cytokines IL-12, IL-1β, and TNF-α in adipose tissue [26]. In addition, phenolic compounds played a role in the bacteriostatic process [27]. Phenolics were also reported to cause damage to bacterial nucleotides and proteins [28]. Another group of compounds with antibacterial activity was flavonoids. These compounds inhibited cell proliferation, induced apoptosis, and suppressed bacterial enzymes required for metabolic processes [29]. Flavonoids also scavenged free radicals produced by bacterial metabolism and disrupted bacterial structural integrity. Moreover, flavonoids were capable of chelating essential minerals such as iron (Fe) and zinc (Zn), which are required for enzymatic activity, DNA replication, growth, and bacterial metabolism [30].

## CONCLUSION AND RECOMMENDATIONS FOR DEVELOPMENT

Pumpkin seeds have the potential to be combined with anti-tuberculosis drugs as a new therapeutic strategy for local resource-based TB management in Majene Regency, West Sulawesi. This study investigated the effects of combining ATT with pumpkin seed (*Cucurbita moschata*) capsules on bacterial count reduction in sputum samples from TB patients. The intervention group exhibited a significant reduction in bacterial count, from 110.8 at baseline to 0.0 post-intervention, whereas the control group experienced only a minor decrease. The highly significant p-value (<0.001) underscores the substantial difference between pre- and post-intervention conditions.

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## AUTHOR DISCLOSURE STATEMENT

The author declares no conflict of interest

**Table 1: Respondent Characteristic**

| Variable | Group | | | | P Value* |
|---|---|---|---|---|---|
| | Intervention | | Control | | |
| | N (28) | % | N (29) | % | |
| **Age (Years)** | | | | | |
| 15 – 20 | 1 | 3,57 | 3 | 10,34 | 0,219 |
| 21 – 40 | 9 | 32,14 | 10 | 34,48 | |
| 41 – 60 | 16 | 57,14 | 10 | 34,48 | |
| > 60 | 2 | 7,14 | 6 | 20,69 | |
| **Gender** | | | | | |
| Man | 18 | 64,29 | 10 | 34,48 | 0,024 |
| Woman | 10 | 35,71 | 19 | 65,52 | |
| **Education** | | | | | |
| Low | 12 | 42,86 | 15 | 51,72 | 0,503 |
| High | 16 | 57,14 | 14 | 48,28 | |
| **Work** | | | | | |
| Working | 16 | 57,14 | 13 | 44,83 | 0,352 |
| Not Working | 12 | 42,86 | 16 | 55,17 | |
| **Family history of TB** | | | | | |
| There is a history | 9 | 32,14 | 8 | 27,59 | 0,707 |
| No History | 19 | 67,86 | 21 | 72,41 | |

Source: Primary Data 2025
*Chi-Square

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**Table 2**: **Compliance level of consuming ATT and Pumpkin Seed Capsules**

| Variable | Intervention | | | | Control | |
|---|---|---|---|---|---|---|
| | Pumpkin Seed Capsules (28) | | ATT (28) | | ATT Only (29) | |
| | N | % | n | % | n | % |
| **First Month Giving** | | | | | | |
| Compliant (>80%) | 28 | 100 | 26 | 92,85 | 25 | 86,2 |
| Non-compliant (<80%) | 0 | 0 | 4 | 14,2 | 2 | 6,8 |
| **Second Month Giving** | | | | | | |
| Compliant (>80%) | 28 | 100 | 28 | 100 | 28 | 100 |
| Non-compliant (<80%) | 0 | 0 | 0 | 0 | 0 | 0 |
| **Third Month Giving** | | | | | | |
| Compliant (>80%) | 28 | 100 | 28 | 100 | 28 | 100 |
| Non-compliant (<80%) | 0 | 0 | 0 | 0 | 0 | 0 |

**Table 3**: **Mean number of bacteria before and after the intervention in the intervention group and control group and number of bacteria before and after the intervention in the peer intervention group and control group**

| PCR Examination (P) | Intervention | | | Control | | | P Value |
|---|---|---|---|---|---|---|---|
| | Mean | SD | N | Mean | SD | n | |
| Checks 0 | 110,82 | 151,89 | 28 | 98,44 | 114,98 | 29 | 0,364* |
| Inspection 1 | 19,60 | 48,39 | 28 | 26,72 | 52,61 | 29 | 0,701* |
| Inspection 2 | 0,60 | 3,21 | 28 | 2,06 | 7,95 | 29 | 0,814* |
| Inspection 3 | 0 | 0 | 28 | 0,62 | 3,34 | 29 | 0,837* |
| Before the Intervention | 110,8 | 151,8 | 28 | 98,4 | 114,9 | 29 | 0,001** |
| After Intervention | 0,0 | 0,0 | 28 | 0,6 | 3,3 | 29 | 0,001** |

Source: Primary Data 2025
*Independent Samples Test
**Wilcoxon

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**Table 4: Differences in PCR Test Results Before and After Intervention in the Intervention Group and Control Group**

| Variable | Intervention | | Control | | Risk ratio | P Value* |
|---|---|---|---|---|---|---|
| | N | % | n | % | | |
| Initial PCR Examination | | | | | | |
| Positive | 28 | 49,12 | 29 | 50,88 | | |
| Negative | 0 | 0 | 0 | 0 | N/A | N/A |
| Total | 28 | 100,00 | 29 | 100,00 | | |
| 1st Month PCR Examination | | | | | | |
| Positive | 9 | 34,62 | 17 | 65,38 | | |
| Negative | 19 | 61,29 | 12 | 38,71 | 2,71 | 0.045 |
| Total | 28 | 49,12 | 29 | 50,88 | | |
| 2nd Month PCR Examination | | | | | | |
| Positive | 1 | 33,33 | 2 | 66,67 | | |
| Negative | 27 | 50,00 | 27 | 50,00 | 1,17 | 0.574 |
| Total | 28 | 49,12 | 29 | 50,88 | | |
| 3rd Month PCR Examination | | | | | | |
| Positive | 0 | 0,00 | 1 | 100,0 | | |
| Negative | 28 | 50,00 | 28 | 50,00 | 1,10 | 0.322 |
| Total | 28 | 49,12 | 29 | 50,88 | | |

Source: Primary Data, 2025
*Chi Square
N/A: Not Applicable

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