Quantifying the Effectiveness of Pharmacy-Led Smoking Cessation Programs: A Randomized Controlled Trial

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Abstract

Objective: This study aimed to quantify the effectiveness of pharmacy-led smoking cessation programs compared to standard care and alternative interventions in terms of smoking cessation rates, cigarette consumption reduction, and smoking-related symptoms improvement.

Methods: A randomized controlled trial was conducted with 300 participants, assigned to either a pharmacy-led smoking cessation program, standard care, or alternative intervention. Outcomes were assessed through biweekly follow-up visits, measuring cessation rates, cigarette consumption, and smoking-related symptoms over six months.

Results: The pharmacy-led program demonstrated a significantly higher smoking cessation rate (45%) compared to standard care (25%) and alternative intervention (30%) ($p < 0.001$). Participants in the pharmacy-led group also showed a greater reduction in cigarette consumption and improved smoking-related symptoms. Participant satisfaction was highest in the pharmacy-led group (8.6 vs. 6.9 and 7.2 in standard and alternative groups, respectively; $p < 0.001$).

Conclusion: Pharmacy-led smoking cessation programs are more effective in achieving smoking cessation, reducing cigarette consumption, and improving smoking-related symptoms compared to standard and alternative interventions. These findings support the integration of pharmacy-led programs into smoking cessation strategies.

Keywords: Pharmacy-led smoking cessation, randomized controlled trial, smoking cessation rates, cigarette consumption, smoking-related symptoms, patient satisfaction.

Introduction

Smoking remains one of the leading causes of preventable morbidity and mortality worldwide, contributing to a significant burden on public health systems (Twombly, 2002). Despite the well-documented risks associated with tobacco use, quitting smoking continues to pose a substantial challenge for many individuals. In response, a variety of smoking cessation programs have been developed, with pharmacy-led initiatives emerging as a promising approach to support individuals in their efforts to quit.

Pharmacists are uniquely positioned to play a pivotal role in smoking cessation due to their accessibility, expertise in medication management, and patient counseling skills. Studies have shown that pharmacy-led smoking cessation programs can be highly effective, leveraging both behavioral and pharmacological strategies to improve quit rates (Greenhalgh et al., 2016; Etter and Stapleton, 2006). For instance, a study by Greenhalgh et al.(2016) found that interventions led by pharmacists were associated with higher quit rates compared to no intervention or brief advice alone. These findings highlight the potential for pharmacy-led programs to provide a valuable alternative to traditional cessation methods.

Pharmacy-led smoking cessation programs often incorporate personalized counseling, nicotine replacement therapies, and other pharmacological treatments, which are tailored to the needs of individual patients (Panel, 2008) However, despite the growing evidence supporting their effectiveness, there is a need for further research to quantify their impact compared to standard care or other established interventions. This study aims

to address this gap by conducting a randomized controlled trial to measure the success rates of pharmacy-led smoking cessation programs and evaluate their relative effectiveness in comparison to standard care.
The objective of this research is to provide robust evidence on the efficacy of pharmacy-led smoking cessation programs, with the goal of informing best practices and enhancing the role of pharmacists in smoking cessation efforts. By rigorously assessing the outcomes of these programs, this study seeks to contribute valuable insights to the field of tobacco cessation and improve public health outcomes.

Literature Review

Smoking cessation remains a critical public health goal due to the extensive health risks associated with tobacco use. Pharmacy-led smoking cessation programs have gained prominence as an effective intervention to support individuals in quitting smoking. This literature review examines the effectiveness of these programs, comparing them to standard care and other interventions.
Pharmacy-Led Smoking Cessation Programs: Pharmacy-led smoking cessation programs often integrate personalized counseling, nicotine replacement therapies (NRT), and other pharmacological treatments. These programs leverage the expertise of pharmacists in medication management and patient counseling to enhance quit rates (Panel, 2008). Pharmacists are ideally positioned to provide accessible, evidence-based interventions due to their frequent patient interactions and ability to tailor treatments to individual needs (Saba et al., 2014).
Effectiveness of Pharmacy-Led Programs: Several studies have demonstrated the effectiveness of pharmacy-led smoking cessation programs. A systematic review by Greenhalgh et al. (2016) found that pharmacy-led interventions, which included both behavioral support and pharmacotherapy, were associated with significantly higher quit rates compared to usual care. The review highlighted the importance of incorporating both counseling and pharmacological support in these programs to maximize their effectiveness. Etter and Stapleton, (2006) conducted a large-scale study evaluating the impact of pharmacy-led smoking cessation programs compared to standard care. Their findings indicated that participants receiving pharmacy-led interventions had higher abstinence rates at six months, emphasizing the added value of personalized support and comprehensive treatment plans. This study underscored the role of pharmacists in delivering effective smoking cessation strategies.
Comparison to Other Interventions: When comparing pharmacy-led programs to other smoking cessation interventions, evidence suggests that they are competitive in terms of efficacy. For instance, a meta-analysis by Cahill et al. (2014) found that smoking cessation programs involving healthcare professionals, including pharmacists, had higher success rates than brief advice alone or self-help materials. This meta-analysis supports the notion that professional-led programs, including those run by pharmacists, can offer substantial benefits over less structured interventions.
Barriers and Challenges: Despite their potential, pharmacy-led smoking cessation programs face several challenges. A study by Schulte et al. (2016) identified barriers such as limited time during pharmacy visits, inadequate training, and variability in program implementation as factors affecting program effectiveness. Addressing these challenges requires ongoing training for pharmacists and support for integrating cessation programs into routine pharmacy practice.
The literature indicates that pharmacy-led smoking cessation programs are effective in improving quit rates compared to standard care and some other interventions. The integration of personalized counseling and pharmacotherapy appears to enhance their efficacy. However, further research is needed to quantify their impact more precisely and to address barriers to implementation. This study aims to fill this gap by conducting a randomized controlled trial to provide robust evidence on the effectiveness of pharmacy-led smoking cessation programs.

Methodology

Study Design: This research employed a randomized controlled trial (RCT) design to evaluate the effectiveness of pharmacy-led smoking cessation programs compared to standard care and alternative interventions. The study aimed to quantify the impact of these programs on smoking cessation rates among participants in primary care settings.

Participants: Participants were recruited from a tertiary hospital over a six-month period.

Inclusion criteria included:

1. adults aged 18 years or older
2. current smokers who expressed a desire to quit
3. able to provide informed consent

Exclusion criteria included:

1. serious medical conditions contraindicating cessation treatment
2. pregnant or breastfeeding women
3. participation in other smoking cessation studies.

A total of 300 participants were enrolled and randomly assigned to one of three groups: (1) the pharmacy-led smoking cessation program group, (2) the standard care group, or (3) the alternative intervention group. Randomization was achieved using a computer-generated randomization schedule.

Interventions

- **Pharmacy-Led Smoking Cessation Program Group:** Participants in this group received a comprehensive smoking cessation program led by trained pharmacists. The program included: (1) personalized counseling sessions; (2) nicotine replacement therapy (NRT); (3) behavioral support; and (4) follow-up consultations every two weeks for six months.
- **Standard Care Group:** Participants in this group received usual care from their primary care providers, which included brief advice on quitting smoking and information on available resources, but no structured support or pharmacotherapy.
- **Alternative Intervention Group:** Participants in this group received a different form of intervention that involved a combination of digital smoking cessation tools (such as mobile apps) and periodic check-ins with a healthcare provider over the study period.

Outcome Measures: The primary outcome measure was the smoking cessation rate, defined as the percentage of participants who achieved abstinence from smoking for at least six months, verified by biochemical tests (e.g., cotinine levels).

Secondary outcome measures included:

1. reduction in the number of cigarettes smoked per day
2. changes in smoking-related symptoms
3. participant satisfaction with the intervention.

Data Collection : Data were collected through a combination of self-reported questionnaires and biochemical verification. Participants completed questionnaires at baseline, three months, and six months to assess smoking behavior, cessation progress, and satisfaction with the intervention. Biochemical verification was performed at the six-month follow-up to confirm smoking cessation.

Statistical Analysis: Data were analyzed using intention-to-treat principles. Descriptive statistics were used to summarize participant demographics and baseline characteristics. Differences in smoking cessation rates between groups were assessed using chi-square tests. Continuous variables, such as reduction in cigarette consumption, were analyzed using analysis of variance (ANOVA) or Kruskal-Wallis tests, depending on data distribution. Logistic regression models were used to control for potential confounders and to evaluate the impact of the pharmacy-led program compared to the other interventions. A p-value of <0.05 was considered statistically significant.

Ethical Considerations: The study was approved by the ethics committee. Written informed consent was obtained from all participants prior to enrollment. Confidentiality of participant data was maintained throughout the study.

Findings

Participant Characteristics: A total of 300 participants were enrolled in the study, with 100 participants in each group. Table 1 summarizes the baseline characteristics of the participants across the three groups.

Table 1. Baseline Characteristics of Participants

Characteristic	Pharmacy-Led Program (n=100)	Standard Care (n=100)	Alternative Intervention(n=100)	p-value
Age (mean ±SD)	45.2 ±12.4	46.0 ±11.9	44.8 ±12.1	0.67
Gender (Male %)	48%	50%	46%	0.78
Smoking Duration (years)	18.3 ±7.2	17.8 ±6.9	18.5 ±7.1	0.61
Cigarettes per Day (mean ±SD)	20.4 ±5.6	21.1 ±5.8	20.8 ±5.4	0.52
Previous Quit Attempts (mean ±SD)	3.2 ±2.1	3.4 ±2.0	3.1 ±2.2	0.74

Primary Outcome: Smoking Cessation Rates: At the six-month follow-up, smoking cessation rates were significantly higher in the pharmacy-led smoking cessation program group compared to the standard care and alternative intervention groups. Table 2 shows the smoking cessation rates and associated statistical analysis.

Table 2. Smoking Cessation Rates at Six Months

Group	Cessation Rate (%)	95% CI	p-value
Pharmacy-Led Program	45%	35.2% - 54.8%	<0.001
Standard Care	25%	17.8% - 32.2%	
Alternative Intervention	30%	22.5% - 37.5%	

Secondary Outcomes

1. **Reduction in Cigarette Consumption:** Participants in the pharmacy-led program showed a greater reduction in the number of cigarettes smoked per day compared to those in the standard care and alternative intervention groups. Table 3 presents the mean reduction in cigarette consumption across the groups.

Table 3. Reduction in Cigarette Consumption

Group	Reduction (cigarettes/day)	95% CI	p-value
Pharmacy-Led Program	12.3 ±4.5	10.8 - 13.8	<0.001
Standard Care	8.7 ±5.1	7.1 - 10.3	
Alternative Intervention	9.5 ±4.8	8.0 - 11.0	

2. **Changes in Smoking-Related Symptoms:** Improvements in smoking-related symptoms were more pronounced in the pharmacy-led program group. Table 4 summarizes the changes in symptoms as reported by participants.

Table 4. Changes in Smoking-Related Symptoms

Symptom	Pharmacy-Led Program (mean ± SD)	Standard Care (mean ±SD)	Alternative Intervention (mean ±SD)	p-value
Cough Severity (score)	2.1 ±1.0	3.0 ±1.2	2.7 ±1.1	0.02
Breathlessness (score)	1.8 ±0.9	2.5 ±1.1	2.4 ±1.0	0.03

3. **Participant Satisfaction:** Participant satisfaction with the intervention was highest in the pharmacy-led program group, as detailed in Table 5.

Table 5. Participant Satisfaction

Group	Satisfaction Score (mean ±SD)	95% CI	p-value
Pharmacy-Led Program	8.6 ±1.2	8.1 - 9.1	<0.001
Standard Care	6.9 ±1.4	6.4 - 7.4	
Alternative Intervention	7.2 ±1.3	6.7 - 7.7	

Discussion

This randomized controlled trial aimed to quantify the effectiveness of pharmacy-led smoking cessation programs compared to standard care and alternative interventions. The findings indicate that pharmacy-led programs significantly enhance smoking cessation rates and reduce cigarette consumption compared to standard care and other interventions.

Effectiveness of Pharmacy-Led Programs: Our study revealed that the pharmacy-led smoking cessation program had a notably higher cessation rate (45%) compared to the standard care (25%) and alternative intervention (30%) groups ($p < 0.001$). This aligns with previous research indicating that pharmacist-led interventions, which include personalized counseling, medication management, and follow-up support, are effective in improving smoking cessation outcomes. For instance, research by Greenhalgh et al. (2016) found that pharmacist interventions led to higher quit rates and better adherence to cessation therapies compared to usual care.

Reduction in Cigarette Consumption: Participants in the pharmacy-led program experienced a greater reduction in cigarette consumption (12.3 cigarettes/day) compared to those receiving standard care (8.7 cigarettes/day) and alternative interventions (9.5 cigarettes/day) ($p < 0.001$). This suggests that the pharmacy-led program not only aids in quitting but also helps in reducing the quantity of smoking among those who continue. These results support findings from a study by Saba et al. (2014), which highlighted the effectiveness of tailored counseling and pharmacotherapy in reducing cigarette consumption.

Improvements in Smoking-Related Symptoms: Participants in the pharmacy-led group reported significant improvements in smoking-related symptoms such as cough severity and breathlessness compared to the other groups ($p = 0.02$ and $p = 0.03$, respectively). This is consistent with evidence suggesting that effective smoking cessation programs can lead to improvements in respiratory symptoms and overall lung health. A study by Tønnesen et al. (2007) demonstrated that comprehensive cessation programs are associated with significant improvements in respiratory symptoms.

Participant Satisfaction: Satisfaction scores were highest among participants in the pharmacy-led program (8.6) compared to standard care (6.9) and alternative interventions (7.2) ($p < 0.001$). This high level of satisfaction may be attributed to the personalized approach and continuous support provided by pharmacists. Previous studies have highlighted that increased patient satisfaction with smoking cessation programs is associated with better adherence and outcomes (Schulte et al., 2016).

Limitations : Despite the strengths of this study, there are some limitations to consider. First, the study was conducted in a specific geographical area, which may affect the generalizability of the results. Second, while the randomized controlled design enhances the validity of the findings, self-reported measures of smoking status and symptoms could be subject to reporting bias. Future research should explore these findings in diverse populations and utilize objective measures to confirm smoking cessation and symptom improvement.

Conclusion

In conclusion, the pharmacy-led smoking cessation program significantly outperforms standard care and alternative interventions in terms of smoking cessation rates, reduction in cigarette consumption, and improvement in smoking-related symptoms. These results underscore the value of integrating pharmacy-led programs into smoking cessation efforts and highlight the need for broader implementation of such programs to enhance public health outcomes.

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