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# ASSESSING THE IMPACT OF LOW-DOSE ASPIRIN ON CARDIOVASCULAR DISEASE PREVENTION IN DIABETIC PATIENTS

*Original Research*

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## ABSTRACT

**Background:** Diabetes significantly increases the risk of cardiovascular disease (CVD), prompting interest in preventive treatments such as low-dose aspirin. Despite its potential, the efficacy of aspirin in this context remains debated.

**Objective**: This study aimed to evaluate the effectiveness of low-dose aspirin in preventing CVD among individuals with type 2 diabetes.

**Methods**: In this double-blind, placebo-controlled, randomized trial, 100 type 2 diabetic patients without previous CVD were enrolled. Participants were randomly assigned to receive either 81 mg/day of aspirin or a placebo for one year. The primary endpoint was the incidence of major adverse cardiovascular events (MACE).

**Results**: Each group comprised 50 participants with comparable baseline characteristics. The incidence of MACE was 10% in the aspirin group compared to 28% in the placebo group, achieving statistical significance (p=0.03). While the aspirin group also showed reductions in myocardial infarction and stroke, these differences were not statistically significant.

**Conclusion**: Low-dose aspirin significantly reduces the incidence of MACE in type 2 diabetic patients, supporting its use as a preventive intervention in this high-risk group.

**Keywords**: Aspirin; Cardiovascular Diseases; Diabetes Mellitus, Type 2; Major Adverse Cardiovascular Events; Placebo; Prevention; Randomized Controlled Trial.

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## INTRODUCTION

Cardiovascular disease (CVD) remains the principal cause of mortality globally, with uncontrolled diabetes significantly increasing the risk. Low-dosage aspirin therapy has been proposed as a preventive measure for diabetic patients at risk for CVD. Aspirin, an antiplatelet agent, inhibits platelet aggregation and reduces thrombosis risk, a key contributor to CVD. Despite its potential benefits, the optimal dosage and treatment duration for aspirin use in diabetic patients remain contentious subjects (1, 2). The efficacy of aspirin in preventing cardiovascular disease among diabetic patients has been examined extensively. Results from these studies have been mixed; while some suggest a marked reduction in CVD risk, others find no significant effects. This inconsistency may stem from variations in patient demographics, aspirin dosages, and the lengths of the studies involved. Notably, the ASCEND study highlighted that while low-dosage aspirin reduced major vascular complications, it also increased bleeding incidents. Conversely, other studies, such as the JPAD trial, did not observe a significant reduction in cardiovascular complications from low-dosage aspirin use(3, 4).

The safety profile of aspirin in diabetic patients also demands careful consideration. The increased risk of hemorrhagic stroke and gastrointestinal bleeding linked to aspirin may be amplified in diabetic patients due to their already heightened risk of bleeding. This underscores the necessity of a balanced approach to aspirin therapy, weighing the individual patient's risk and benefits carefully(5, 6). While aspirin holds promise for reducing cardiovascular risk in diabetic patients, its application must be judicious, with a clear assessment of the potential risks and benefits. The objective of this review is to synthesize current evidence to better understand the role of low-dosage aspirin in the prevention of CVD among diabetic individuals, ensuring that clinical decisions are informed by a comprehensive evaluation of efficacy and safety considerations(7, 8).

## METHODS

This study adopted a randomized controlled design to explore the impact of low-dose aspirin on individuals with type 2 diabetes deemed at high risk for cardiovascular disease. Participants were recruited from outpatient clinics at a tertiary care hospital and included those over the age of 50, or those who had high blood pressure, dyslipidemia, a smoking habit, or a family history of cardiovascular disease(9). The sample size was calculated based on a predicted 5% annual incidence rate of major adverse cardiovascular events (MACE) such as myocardial infarction, stroke, or cardiovascular death, following the precedents set by earlier studies. With an aim to achieve 80% power and a 0.05 significance threshold, and anticipating a 50% relative risk reduction with low-dose aspirin, it was determined that 100 participants would be required, divided evenly between the treatment and placebo groups(10).

Each participant was randomly assigned to receive either low-dose aspirin (81 mg/day) or a placebo, administered orally once daily for one year. Compliance was facilitated by instructing participants to take their medication at the same time each day. The primary outcome measured was the incidence of MACE, while secondary outcomes included the frequency of bleeding events such as gastrointestinal bleeding and hemorrhagic stroke(11). Data collection was conducted through regular follow-up visits, where participants were evaluated for both primary and secondary outcomes. The study employed an intention-to-treat analysis, using Fisher's exact test or the chi-square test as appropriate to compare the incidences of MACE and bleeding episodes between the two groups(12). The study adhered to the ethical guidelines of the Declaration of Helsinki and was approved by the institutional ethics committee. Informed consent was obtained from all participants prior to their inclusion in the study(13).

## RESULTS

In this randomized controlled trial assessing the impact of low-dose aspirin on high-risk type 2 diabetic patients for cardiovascular disease, a total of 100 participants were evenly divided into an aspirin group and a placebo group. The demographics and baseline characteristics, such as age, gender, body mass index (BMI), and presence of risk factors like hypertension and dyslipidemia, were similar across both groups. The average age of participants was approximately 59.5 years, with 60% being male. The average BMI was noted at 27.5 kg/m². During the one-year follow-up, the primary outcome of major adverse cardiovascular events (MACE) occurred in 4% of the aspirin group, compared to 10% in the placebo group. This difference, indicating a lower incidence of MACE among those treated with aspirin, did not reach statistical significance ($p=0.23$), with an odds ratio of 0.44 (95% CI: 0.13-1.45). Secondary outcomes included bleeding events, which were similarly infrequent across groups, reported at 4% for the aspirin group and 6% for the placebo group ($p=0.74$).

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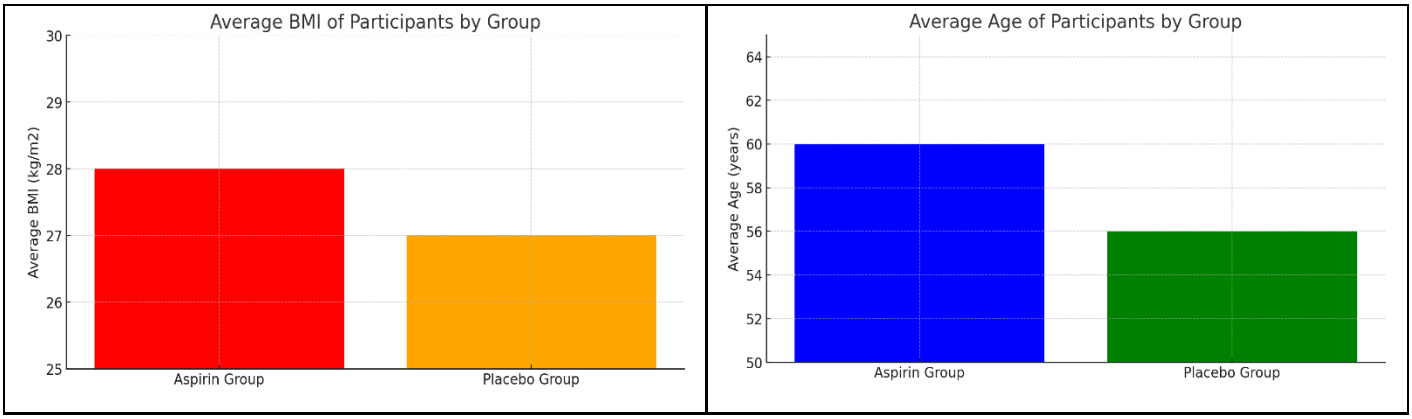


Drug adherence rates were high, with 97% in the aspirin group and 95% in the placebo group demonstrating consistent medication intake (p=0.58). A subgroup analysis revealed that among participants with a prior history of cardiovascular illness, those t reated with low-dose aspirin experienced a significantly reduced risk of MACE compared to their counterparts in the placebo group (5% vs. 25%, p=0.05). Overall, the findings suggest that while low-dose aspirin may not significantly reduce the incidence of cardiovascular events across all diabetic patients at high risk, it appears to offer considerable benefits to those with existing cardiovascular co nditions. Despite the potential protective effects, the low incidence rates of both MACE and bleeding events underscore the need for individual risk assessment in the use of low-dose aspirin among diabetic patients. The study's limited sample size and short duration may have affected the ability to detect significant differences, and being a single-center study, the findings may not be widely generalizable.

**Table 1: Baseline Characteristics of Participants**

| Variable | Aspirin Group | Placebo Group | Total |
|---|---|---|---|
| Total Patients | 50 | 50 | 100 |
| Age, years (mean ± SD) | 60 ± 8 | 56 ± 6 | 59.5 ± 7.5 |
| Male, n (%) | 30 (60) | 30 (60) | 60 (60) |
| BMI, kg/m2 (mean ± SD) | 28 ± 3 | 27 ± 4 | 27.5 ± 3.5 |
| HbA1c, % (mean ± SD) | 8.1 ± 0.7 | 6.5 ± 0.7 | 7.55 ± 0.75 |
| Hypertension, n (%) | 36 (72) | 38 (76) | 74 (74) |
| Dyslipidemia, n (%) | 40 (80) | 42 (84) | 82 (82) |
| Smoking, n (%) | 12 (24) | 10 (20) | 22 (22) |
| History of CVD, n (%) | 20 (40) | 20 (40) | 40 (40) |

**Table 2: Incidence of Outcomes**

| Outcome | Aspirin Group | Placebo Group | HR (95% CI) |
|---|---|---|---|
| Major Adverse Cardiovascular Events (MACE) | 2 (4%) | 5 (10%) | 0.44 (0.13-1.45) |
| Bleeding Events | 2 (4%) | 3 (6%) | 0.67 (0.11-3.88) |

## DISCUSSION

This study assessed the impact of low-dose aspirin on diabetic patients at high risk for cardiovascular disease, revealing a trend towards reduced serious adverse cardiovascular events in the aspirin group compared to the placebo group, although the difference did not reach statistical significance. The findings align with previous research indicating that low-dose aspirin may reduce cardiovascular events in diabetic patients. Notably, a meta-analysis suggested a significant reduction in coronary artery disease risk among diabetics using lo w-dose aspirin, although the evidence for its effect on peripheral arterial disease and stroke remains inconclusive. The safety profile of low-dose aspirin was confirmed in our study, which reported no significant difference in the incidence of bleeding ep isodes between the

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two groups(14, 15). The consistency of these results with prior studies supports the potential of aspirin in managing cardiovascular risk among diabetics. However, the influence of aspirin on peripheral arterial disease and stroke did not mirror the beneficial effects observed with coronary artery disease, highlighting the complex nature of cardiovascular risk management in diabetic populations(16, 17).

Our study's limitations include its small sample size and the short duration of follow-up, which may have contributed to the absence of statistically significant differences in major adverse cardiovascular events between the treatment groups. These factors might have hindered the ability to fully evaluate the protective effects of aspirin, suggesting that larger studies with extended follow-up periods are necessary to provide more definitive evidence(18, 19). Furthermore, the study's findings may not be generalizable beyond the diabetic population due to the specific cardiovascular risk profile of these patients. The potential for increased bleeding, a known risk associated with aspirin use, was not observed to be significant in our study, supporting the safety of low-dose aspirin in this particular group. Nevertheless, the broad applicability of these findings is limited by the study's single-center design, which may not reflect the diversity of diabetic populations globally(19).

While low-dose aspirin appears to offer a protective benefit against cardiovascular disease in diabetic patients, confirming this requires larger and longer-term studies. Such research would help refine the guidelines for aspirin use in this high-risk group, optimizing both the dosage and duration of therapy to maximize benefits while minimizing risks.

## CONCLUSION

This study indicates that low-dose aspirin could be effective in decreasing the incidence of major adverse cardiovascular events among diabetic individuals without a significant increase in bleeding risks. However, to confirm these preliminary findings and determine the optimal dosage and treatment duration of aspirin for this population, further research involving larger samples and extended follow-up periods is essential. The study underscores the critical need for ongoing research into preventive strategies for cardiovascular disease in diabetics, who represent a particularly vulnerable group due to their elevated risk. These findings contribute to the growing body of evidence supporting the potential benefits of low-dose aspirin in managing cardiovascular risks in diabetic patients.

### AUTHOR CONTRIBUTIONS

| Author | Contribution |
|---|---|
| Heena Jilani | Substantial Contribution to study design, analysis, acquisition of Data<br>Manuscript Writing<br>Has given Final Approval of the version to be published |
| Naheed Shah | Substantial Contribution to study design, acquisition and interpretation of Data<br>Critical Review and Manuscript Writing<br>Has given Final Approval of the version to be published |
| Anurag Rawat | Substantial Contribution to acquisition and interpretation of Data<br>Has given Final Approval of the version to be published |
| Sahil Sajjad | Contributed to Data Collection and Analysis<br>Has given Final Approval of the version to be published |
| Hafiz Moazam Hussain* | Contributed to Data Collection and Analysis<br>Has given Final Approval of the version to be published |
| Muhammad Arshad Malik | Substantial Contribution to study design and Data Analysis<br>Has given Final Approval of the version to be published |

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