

**Saudi Toxicology Journal (STJ)**Journal home page: <https://uqu.edu.sa/s.toxicology.s/S.T.J>*Article***Awareness of Aspirin's Dual Role as an Anti-cancer Agent and Anti-thrombotic Agent and its Association with Medication Adherence to Low-Dose Aspirin: A Cross-Sectional Study**Hadhyah N. Alabdali¹, Sarah S. Al- Harbi², Layan Z. Sharalahi¹, Razan A. Alghamdi¹, Abrar M. Bokhari¹, Yosra Z. Alhindi^{3*}¹ Faculty of Medicine, Umm Al-Qura University, Makkah, Saudi Arabia.² Faculty of Pharmacy, Umm Al-Qura University, Makkah, Saudi Arabia.³Department of Pharmacology and Toxicology, Faculty of Medicine, Umm Al-Qura University, Makkah, Saudi Arabia*Corresponding Author Yzhindi@uqu.edu.sa 00966504530609

Citation: Alabdali, H. N., Al-Harbi, S. S., Sharalahi, L. Z., Alghamdi, R. A., Bokhari, A. M., Alhindi, Y. Z. Awareness of Aspirin's Dual Role as an Anti-cancer Agent and Anti-thrombotic Agent and its Association with Medication Adherence to Low-Dose Aspirin: A Cross-Sectional Study. *STJ*, 2025, 2, 13-23

<https://doi.org/10.70957/uqu.edu.sa/s.toxicology.s/stj.2025.2.2>

Received: 11 January 2025

Accepted: 25 February 2025

Published: 16 March 2025



Copyright: © 2025 by the authors.

Licensee Umm Al-Qura University, Makkah, Saudi Arabia

Abstract:

Background: Aspirin is known to be an effective antithrombotic agent. Multiple studies have been studying its effect on cancer as colorectal cancer.

Aim: This study aimed to measure the Awareness of Aspirin's Dual Function as an Anti-Cancer Agent and Anti-Thrombotic among Residents of the Makkah region in the Kingdom of Saudi Arabia.

Methods: A cross-sectional study was conducted involving 490 participants from the Makkah region. Data collection was achieved through a self-reported online questionnaire and distributed via social media platforms from period of November 2024 until January 2025.

Results: Over 340 of the participants in this research have bachelor's degrees. However, while investigating awareness regarding the preventative effect of aspirin's dual role, only 8.4% were aware. Moreover, in terms of assessing the adherence level, we only included 306 (62.4%) of the participants who reported taking aspirin. The majority of them showed low adherence levels.

Conclusion: This study reveals a lack of awareness regarding of the knowledge abouts Aspirin as an Anti-Cancer and Anti-Thrombotic Agent among the residents of Makkah region, which appears to have an effect on medication adherence. Awareness promotion is essential to enhance public health outcomes.

Keywords: Aspirin; Anticancer; Antithrombotic, Makkah, Adherence.

Introduction

Aspirin, known as a salicylate and a non-steroidal anti-inflammatory drug (NSAID), In 1897, Felix Hoffman, a German chemist working for the Bayer company, was able to modify salicylic acid to create acetylsalicylic acid, which was named aspirin, has since become one of the most widely used medications worldwide [1]. Aspirin has a well-established secondary preventive effect in preventing coronary and cerebrovascular disorders by preventing platelet aggregation [1]. More than 200 researchers involving over 200,000 patients indicated the benefits of low-dose aspirin in individuals with acute coronary syndromes or those who have experienced myocardial infarction, stroke, or transient ischemic episodes [1,2]. Aspirin dosages of 75–100 mg are advised by a number of professional associations and government organizations for patient subgroups with overt cardiovascular disease who have a 10-year risk of myocardial infarction or stroke exceeding 20% [22]. In addition to its well-known advantages as a cardiovascular drug, numerous researchers have been monitoring and examining aspirin's effect in preventing and treating cancer in recent years. In Bosetti meta-analysis, it showed that consistent aspirin usage was linked to a 27% lower risk of colorectal cancer and an overall 39% lower risk of squamous cell esophageal cancer [3]. In recent long-term monitoring of participants in trials to prevent CV disease, it was also shown that daily aspirin use for at least five years decreased the 20-year incidence of colon cancer by 24% and the mortality rate associated with colorectal cancer by 35% [4]. Despite its widespread use as a cardiovascular medication, aspirin's role in cancer treatment might still be unfamiliar to many in our community; therefore, we will evaluate the level of awareness regarding aspirin's dual function as an anti-cancer and anti-thrombotic agent and analyze its connection to adherence to low-dose aspirin therapy. A medication like aspirin, which is commonly used among different people in our community, can only achieve its full potential and benefit when the patient is fully compliant with its use. Adherence to prescribed medications is influenced by multiple factors such as financial burden, side effects, multiple prescriptions, health literacy challenges, and the complexity of the medication schedule, in addition to psychological conditions, such as depression and underlying

cognitive dysfunction, can contribute to poor adherence to medications [5].

This study also seeks to explore the patterns of aspirin consumption among residents of the Makkah region and the factors influencing their decision to use or not use it.

Methods

A cross-sectional investigation was conducted in Makkah City, Saudi Arabia, to evaluate public awareness regarding aspirin's dual therapeutic mechanisms as an anti-cancer and anti-thrombotic agent and the correlation between awareness of aspirin's dual role and medication adherence among low-dose aspirin users.

Study Population

The study included adults aged 18 years and above who resided in Makkah City, Saudi Arabia. The online questionnaire was distributed among the general population for voluntary participation to ensure representation across various demographic and health backgrounds.

Sample Size Determination

Sample size calculations were conducted using OpenEpi version 3.0. OpenEpi provides statistics for counts and measurements in descriptive and analytic studies.

According to World Population Review; the total population of Makkah Al-Mukarramah in 2024 population is now estimated at 2,184,560. (worldpopulationreview),

According to OpenEpi we placed the total population of Makkah with a Confidence level of 95%, an Anticipated frequency of 50%, and a Design effect of 1, the minimum required sample size was calculated to be 385 participants.

Questionnaire Development

A structured 22-item questionnaire was developed and administered electronically. The questionnaire included three distinct sections:

Sociodemographic data: Collecting data on participants' age, gender, educational level, and health status.

Awareness Assessment: Evaluating participants' awareness of aspirin's dual therapeutic mechanisms as an anti-cancer and anti-thrombotic agent.

Medication Adherence: targeting current low-dose aspirin users to assess adherence patterns and their correlation with their level of awareness.

Awareness assessment: The Awareness assessment questionnaire design was adapted from a previously validated Lloyd,

Kelly E et al. survey investigating public awareness of aspirin's anti-cancer properties. Adherence Assessment [6].

Medication adherence among low-dose aspirin users was measured using the validated Morisky)7(Medication Adherence Scale (MMAS-8) [7]. This tool includes eight items scored as follows:

Affirmative response: 1 point

Negative response: 0 points

Adherence levels were categorized as:

Low adherence: Total score < 6

Intermediate adherence: Total score of 6-7

High adherence: Total score = 8

Data collection

Data collection was conducted from period of November 2024 until January 2025. in Makkah City, Saudi Arabia .The questionnaire was distributed electronically using Google Forms online questionnaire.

To ensure the tool was accurate and consistent, a pretest of the questionnaire was conducted on 10% of the sample size ,which was not included in the final study , in order to assess data for tool validation ,feasibility , clarity ,and comprehensibility. The completed survey was made available in both English and Arabic languages .The participants were informed about the study objectives ,and those who voluntarily agreed to participate were provided with a link to the survey. Each participant was allowed to submit the survey only once. The participants provided informed electronic consent before answering the survey.

Data Analysis

Statistical analyses were performed using SPSS software version 23 (IBM, Armonk, NY, USA). Categorical variables were presented as frequencies and percentages. Statistical significance was tested using a chi-square test to detect any association between the categorical variables. The level of data significance was set at a P-value <0.05

Ethical Considerations

This study adhered to established ethical guidelines and received approval from the Institutional Review Board (IRB) approval No. HAPO-02-K-012-2024-03-2081 at the Faculty of Medicine, Umm Al-Qura University, Makkah, Saudi Arabia. Data were collected over three months in Makkah. The participation was voluntary and informed consent was obtained from all participants prior to completing the questionnaire. Confidentiality and anonymity of participant data were ensured throughout the study.

Results:

Over 494 participants completed the survey, and four were excluded for not agreeing to participate, resulting in 490 respondents being analyzed. The demographic characteristics of the questionnaire respondents showed that a large proportion of participants were female compared to male. The total number of people analyzed in this study consisted of 24% males and 76% females.

In terms of age distribution, the majority of respondents were between the ages of 40-49 years, comprising 31.2% of the total sample, followed by those aged 18-29 years (24.1%). A significant portion of participants had a bachelor's degree, making up 70.2% of the respondents, and 8.2% had a graduate or professional degree.

Regarding chronic conditions, most participants reported no comorbidities (71.6%), while 9.8% had diabetes mellitus (DM), and 9.0% had hypertension (HTN). In addition, 41.4% of participants indicated a family history of cardiovascular disease 12.3% and colorectal cancer 29.1%, while 48.0% had no family history, and 10.6% were unsure. **Table 1** summarizes the overall adherence level of participants to their daily low-dose aspirin. The majority (78.3%) were categorized as low adherence. A smaller proportion had moderate adherence (17.4%), and only a very small percentage exhibited high adherence (4.3%).

Table 2 demonstrates the association between demographic characteristics and adherence levels among 184 participants whom answered the questions for the adherence asnd they take aspirin. Significant differences were observed in adherence based on age ($P = 0.001$), with younger participants (18-29 years) showing lower adherence, while older age groups (50-59 and >60 years) exhibited more variable adherence patterns. The group aged 40-49 years had the highest proportion of low adherence (30.4%). Chronic conditions, particularly cardiovascular disease (CVD), were also significantly associated with adherence levels ($P = 0.040$), with individuals with CVD demonstrating lower adherence. Notably, participants without comorbidities had the highest low adherence, and 45.1% showed low adherence ($P = 0.002$). In contrast, gender and educational level showed no significant impact on adherence ($P = 0.238$ and $P = 0.177$, respectively). Similarly, having a family history of cardiovascular disease or cancer did not significantly affect adherence ($P = 0.302$). Overall, age and chronic conditions, particularly CVD, were the most significant factors influencing adherence levels in this population.

Table 3 highlights the association between aspirin use and adherence levels among participants. A significant relationship was found between current aspirin use and low adherence ($P = 0.007$) However, side effects of aspirin, including gastrointestinal issues and bleeding, did not significantly affect adherence ($P = 0.330$). In terms of reasons for taking aspirin, the most common was cardiovascular disease prevention (36.3%), followed by pain relief (29.1%), but these reasons did not significantly influence adherence levels ($P = 0.319$). Aspirin use was positively associated with adherence, but side effects and reasons for use were insignificant.

Table 4 illustrates the relationship between aspirin awareness and adherence levels. There was no significant association between prior knowledge of aspirin's potential role in cancer prevention and adherence levels ($P = 0.296$). Most participants were unaware of aspirin's anti-cancer benefits, and only a small percentage of those who were aware showed high adherence to the medication. The sources of information did not significantly affect adherence. When asked about the information needed to decide on regular aspirin use for cancer prevention, the most common responses were concerns about long-term side

effects (44.0%) and understanding how aspirin works (30.4%). However, these informational needs did not significantly impact adherence. The only significant finding was a small group of participants (1.1%) requesting additional information, which was associated with lower adherence ($P = 0.039$).

Overall, aspirin awareness and information needs were not strongly linked to adherence levels, with the majority of participants showing low adherence regardless of their knowledge or the information they sought.

Table 5 explores the relationship between aspirin awareness and various demographic characteristics. The results show that age was the only significant factor associated with aspirin awareness ($P = 0.012$). Younger participants, mainly those aged 18-29, were more likely to be aware of aspirin's potential to reduce cancer risk, with awareness decreasing as age increased groups compared whom said yes to awareness. However, aspirin awareness was not significantly different between genders ($P = 0.423$) or across different educational levels ($P = 0.713$).

Additionally, the analysis revealed no significant associations between aspirin awareness and the presence of chronic conditions such as hypertension, diabetes, or cardiovascular disease (P -values ranging from 0.052 to 0.692). Similarly, having a family history of cardiovascular disease or cancer did not significantly affect awareness ($P = 0.610$).

In conclusion, age was the primary demographic factor influencing aspirin awareness, while other factors like gender, education, chronic conditions, and family history did not show significant associations.

Discussion

This study discovered that 80.4% of Makkah residents were unaware of aspirin's anti-cancer properties. Our results are consistent with global findings, which demonstrate low awareness levels among aspirin users (9.5%) and non-users (4.7%) [8]. Despite abundant evidence of aspirin's anti-cancer effects, including a 20–27% reduced risk of colorectal cancer and a 10% to 50% reduction in other types of cancers [9,10].The benefits of aspirin remain underappreciated, even among populations with relatively higher education attainment.

Table 1. Adherence level score

Questions	Answer	
	Yes	No
Q1. Do you sometimes forget to take your daily low aspirin dose?	110 (60.4%)	72 (39.6%)
Q2. Over the past two weeks, were there any days you did not take your daily low aspirin dose medication?	114 (62.6%)	68 (37.4%)
Q3. Have you ever cut back or stopped taking your medication without telling your doctor because you felt worse when you took it?	90 (49.5%)	92 (50.5%)
Q4. When you travel or leave home, do you sometimes forget to bring along your medication?	88 (48.4%)	94 (51.6%)
Q5. Did you take your daily low aspirin dose medicine yesterday?	34 (18.7%)	148 (81.3%)
Q6. When you feel like your symptoms or general health state is stabilized, you sometimes stop taking your medicine.	126 (69.2%)	56 (30.8%)
Q7. Do you ever feel hassled about sticking to your daily low aspirin dose plan?	85 (46.7%)	97 (53.3%)
Q8. How often do you have difficulty remembering your low aspirin dose medication?	78 (42.9%)	104 (57.1%)
Adherence level		
Low	144 (78.3%)	
Moderate	32 (17.4%)	
High	8 (4.3%)	

Table 2. Association between demographic characteristics with adherence level.

Variables	Adherence Level			P-value
	Low	Moderate	High	
Total	144 (78.3%)	32 (17.4%)	8 (4.3%)	
Gender				0.238
Male	35 (19.0%)	7 (3.8%)	4 (2.2%)	
Female	109 (59.2%)	25 (13.6%)	4 (2.2%)	
Age				0.001
<18	2 (1.1%)	0 (0.0%)	0 (0.0%)	
18-29	8 (4.3%)	7 (3.8%)	0 (0.0%)	
30-39	20 (10.9%)	3 (1.6%)	0 (0.0%)	
40-49	56 (30.4%)	14 (7.6%)	0 (0.0%)	
50-59	47 (25.5%)	3 (1.6%)	5 (2.7%)	
>60	11 (6.0%)	5 (2.7%)	3 (1.6%)	
Educational level				0.177
Less than a high school diploma	7 (3.8%)	0 (0.0%)	0 (0.0%)	
High school diploma or equivalent	20 (10.9%)	3 (1.6%)	1 (0.5%)	
Bachelor's degree	100 (54.3%)	27 (14.7%)	4 (2.2%)	
Graduate or professional degree	17 (9.2%)	2 (1.1%)	3 (1.6%)	
Chronic conditions				
HTN	17 (9.2%)	3 (1.6%)	3 (1.6%)	0.085
DM	28 (15.2%)	4 (2.2%)	3 (1.6%)	0.263
Hyperlipidemia	15 (8.2%)	4 (2.2%)	1 (0.5%)	0.932
CVD	6 (3.3%)	2 (1.1%)	2 (1.1%)	0.040
Coagulation disorders	3 (1.6%)	0 (0.0%)	0 (0.0%)	0.655
Others	3 (1.6%)	1 (0.5%)	0 (0.0%)	0.852
Not have any comorbidities	83 (45.1%)	22 (12.0%)	0 (0.0%)	0.002
Do you have a family history of cardiovascular disease or cancer?				0.302
Yes	73 (39.7%)	12 (6.5%)	6 (3.3%)	
No	59 (32.1%)	18 (9.8%)	2 (1.1%)	
I am not sure	12 (6.5%)	2 (1.1%)	0 (0.0%)	

Table 3. Association between aspirin use with adherence level.

Variables	Adherence Level			P-value
	Low	Moderate	High	
Total	144 (78.3%)	32 (17.4%)	8 (4.3%)	
Are you currently on a low aspirin dose?				0.007
Yes	51 (27.7%)	9 (4.9%)	7 (3.8%)	
No	93 (50.5%)	23 (12.5%)	1 (0.5%)	
If you have taken or are currently taking aspirin, have you experienced any side effects:				0.330
Gastrointestinal disorders	14 (7.7%)	0 (0.0%)	0 (0.0%)	
Bleeding	12 (6.6%)	1 (0.5%)	1 (0.5%)	
Allergic reactions	3 (1.6%)	0 (0.0%)	0 (0.0%)	
No, I didn't have any SEs	114 (62.3%)	31 (16.9%)	7 (3.8%)	
What is the main reason you take aspirin?				0.319
Pain relief	52 (29.1%)	11 (6.1%)	1 (0.6%)	
Prevention of stroke	11 (6.1%)	1 (0.6%)	0 (0.0%)	
Prevention of cardiovascular disease	65 (36.3%)	12 (6.7%)	6 (3.4%)	
Prevention of cancer	0 (0.0%)	1 (0.6%)	0 (0.0%)	
All of above	1 (0.6%)	1 (0.6%)	0 (0.0%)	
Other reasons	12 (6.7%)	4 (2.2%)	1 (0.6%)	

Table 4. Association between aspirin awareness with adherence level.

Variables	Adherence level			P-value
	Low	Moderate	High	
Total	144 (78.3%)	32 (17.4%)	8 (4.3%)	
Before completing this survey, were you aware that aspirin could reduce the risk of developing certain types of cancers?				0.296
Yes	8 (4.4%)	4 (2.2%)	1 (0.5%)	
No	122 (67.0%)	23 (12.6%)	7 (3.8%)	
Not sure	12 (6.6%)	5 (2.7%)	0 (0.0%)	
If yes, where and how did you hear about this?				
Healthcare workers	9 (4.9%)	3 (1.6%)	0 (0.0%)	0.606
Family	6 (3.3%)	0 (0.0%)	0 (0.0%)	0.423
Friends	6 (3.3%)	1 (0.5%)	0 (0.0%)	0.815
Social media/ Internet	13 (7.1%)	3 (1.6%)	1 (0.5%)	0.947
Research articles	7 (3.8%)	1 (0.5%)	1 (0.5%)	0.546
Other	1 (0.5%)	0 (0.0%)	0 (0.0%)	0.870
If you did not know previously about the role of aspirin as an anti-cancer, what kind of information do you think you would need to help you decide on whether to take aspirin regularly for cancer prevention?				
Long-term side effects of aspirin usage	81 (44.0%)	14 (7.6%)	2 (1.1%)	0.121
How does aspirin promote its anti-cancer effect	56 (30.4%)	10 (5.4%)	3 (1.6%)	0.722
What is the optimum dose to initiate this effect?	53 (28.8%)	12 (6.5%)	3 (1.6%)	0.997
What kind of cancers does it prevent?	62 (33.7%)	14 (7.6%)	4 (2.2%)	0.928
All of above	144 (78.3%)	32 (17.4%)	8 (4.3%)	NA
Other	2 (1.1%)	0 (0.0%)	1 (0.5%)	0.039

Table 5. Association between aspirin awareness and demographic characteristics#

Variables	Were you aware that aspirin could reduce the risk of developing certain types of cancers?			P-value
	Yes	No	Not sure	
Total	41 (8.6%)	385 (80.4%)	53 (8.1%)	
Gender				
Male	13 (2.7%)	90 (18.8%)	11 (2.3%)	0.423
Female	28 (5.8%)	295 (61.6%)	42 (8.8%)	
Age				
<18	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.012
18-29	19 (4.0%)	85 (17.7%)	13 (2.7%)	
30-39	0 (0.0%)	62 (12.9%)	8 (1.7%)	
40-49	9 (1.9%)	124 (25.9%)	20 (4.2%)	
50-59	9 (1.9%)	90 (18.8%)	8 (1.7%)	
>60	4 (0.8%)	24 (5.0%)	4 (0.8%)	
Educational level				
Less than a high school diploma	0 (0.0%)	12 (2.5%)	3 (0.6%)	0.713
High school diploma or equivalent	9 (1.9%)	64 (13.4%)	11 (2.3%)	
Bachelor's degree	28 (5.8%)	277 (57.8%)	35 (7.3%)	
Graduate or professional degree	4 (0.8%)	32 (6.7%)	4 (0.8%)	
Chronic conditions				
HTN	0 (0.0%)	41 (8.6%)	3 (0.6%)	0.052
DM	6 (1.3%)	38 (7.9%)	4 (0.8%)	0.512
Hyperlipidemia	1 (0.2%)	32 (6.7%)	3 (0.6%)	0.344
CVD	3 (0.6%)	9 (1.9%)	1 (0.2%)	0.163
Coagulation disorders	0 (0.0%)	3 (0.6%)	0 (0.0%)	0.692
Others	0 (0.0%)	13 (2.7%)	0 (0.0%)	0.196
Not have any comorbidities	31 (6.5%)	268 (55.9%)	42 (8.8%)	0.281
Do you have a family history of cardiovascular disease or cancer?				
Yes	16 (3.3%)	160 (33.4%)	24 (5.0%)	0.610
No	23 (4.8%)	182 (38.0%)	25 (5.2%)	
I am not sure	2 (0.4%)	43 (9.0%)	4 (0.8%)	

There are some missing data, some participants did not answer all the questions or all parts of the survey.

There was a significant relationship between awareness and age ($P = 0.012$), with younger subjects (18–29 years) demonstrating a higher awareness of aspirin's protective effects compared to older age groups. This may be attributed to younger individuals' increased use of digital platforms, where health-related information is more readily accessible. Worldwide, knowledge of anti-cancer aspirin benefits remains poor, with 9.5% of users and 4.7% of non-users appreciating the protective effects of aspirin [8]. Individuals with less education or lower socioeconomic positions are often less aware; in contrast, women, younger people, and those without a cancer history are less likely to realize the possible significance of aspirin's role in cancer prevention [8,9]. However, contrary to global trends, the present investigation found no statistically significant differences in awareness by gender ($P = 0.423$) or

educational level ($P = 0.713$). Moreover, the method used to test knowledge can alter the results, with prompted recall frequently producing higher levels of awareness than unprompted recall [11]. Despite the current limited understanding of aspirin's preventive impact, long-term usage has consistently been related to a decreased risk of malignancies with confirmed prophylactic effectiveness, especially gastrointestinal cancers [9]. To address these knowledge gaps, universal public health campaigns could be a valuable technique for raising awareness among all groups.

At the international level, efforts to increase awareness have included educational programs such as social media campaigns, provider-patient discussions, and large-scale trials like Add-Aspirin, which investigates the use of aspirin as adjuvant therapy [12]. These methods may raise awareness among this population.

However, side effects, such as gastrointestinal bleeding, may prevent patients from receiving the full advantages of aspirin [6]. Targeted educational initiatives that discuss the additional protective effect of aspirin and address these concerns could help improve public knowledge and acceptance.

This study found that 78.3% of patients had poor adherence to low-dose aspirin medication. Adherence was also found to significantly correlate with age ($P = 0.001$) and chronic diseases, such as cardiovascular disease ($P = 0.040$). The lowest proportion of low adherence was found in participants with comorbidities (38.3%, $P = 0.002$), proving that patients' perceptions of health threats may substantially affect treatment adherence.

These results are in agreement with international studies where adherence was between 72% and 92%, being higher in secondary prevention settings [13,14]. Factors that influence adherence to a treatment regimen range from forgetfulness to lack of understanding to patients' perception of risks and benefits [15]. Motivation ($P = 0.046$) and health literacy ($P = 0.017$) had a substantial association with adherence [14,15]. Nevertheless, adverse effects, including gastrointestinal and bleeding symptoms, did not appear significant ($P = 0.330$).

Healthcare providers, who play a crucial role in addressing these barriers, are not new to these challenges. Patient education and individually tailored interventions have been shown to increase adherence considerably [16]. Medication reminders, simple but effective modifications to dosing regimens, and feedback mechanisms in patient care may also increase compliance [17].

Although awareness implies that it is positively correlated with adherence, no significant correlation was observed between these two ($P = 0.296$). Previous research has shown that simply being aware does not always result in behavioral change [8]. For instance, while patients may know that aspirin has benefits, they do not adhere to the regimen due to several reasons, such as forgetfulness, psychosocial influences, and lack of salience.

Behavioral interventions geared toward dealing with these obstacles have proven to be moderately successful. For example, a multitude of interventions, such as educational strategies, reminders, feedback,

and monitoring, have proved to be beneficial in boosting adherence to different prescription medications [18]. Consequently, this study's findings emphasize the need for comprehensive interventions beyond education to address the psychosocial and tangible barriers that hinder compliance with recommendations.

Cardiovascular disease prevention was the primary motivation for aspirin use among participants (36.3%), followed by pain relief (29.1%). Compliance was significantly lower among patients not taking aspirin when surveyed ($P = 0.007$), stressing the point that routine use of aspirin is likely supported by better compliance. No statistically significant associations were observed for either side effect ($P = 0.330$) or reasons for use ($P = 0.319$) with adherence in this study. These discoveries suggest that adherence may not be the key determinant of these characteristics. Instead, more systemic factors, like access to healthcare and patient-provider communication, may be more fundamental and intrinsic than adherence itself.

Aspirin utilization varies between countries, with reported rates of use for primary and secondary prevention of 24.8% and 34.3%, respectively [19]. Cost, accessibility, and inadequate education are barriers to use as well, as this study's results showed [13]. Addressing these difficulties through community outreach and collaboration between healthcare providers holds the promise of greatly enhancing usage and adherence rates.

The findings of this study suggest that such an approach is warranted, as it addresses both awareness and adherence gaps. Broader outreach might be carried out using digital platforms, community-based activities, and incorporating aspirin knowledge into existing health promotion programs [12]. Furthermore, precision medicine tools can help identify high-risk patients most likely to benefit from aspirin therapy, assuring the best risk-benefit ratio [9].

Patient education and adherence are key to achieving better health outcomes and decreasing costs, and healthcare practitioners ought to value this. Streamlining dose regimen and decreasing expenditures can improve compliance. Additional research shall be conducted to cultivate measures such as telemedicine solutions and patient-centered care

models to improve awareness and adherence in diverse populations.

Limitations

This study has a few limitations to consider when interpreting the findings with caution. The cross-sectional design precludes inferring causation, for example, whether awareness leads to adherence to low-dose aspirin. Reliance on self-reported data carries risks of recall bias and social desirability bias, and these biases may affect levels of adherence and awareness. The study population was restricted to residents of Makkah, Saudi Arabia, thereby limiting its generalizability to other healthcare systems or cultural settings. In addition, awareness assessments did not fully capture participants' knowledge of aspirin's anti-cancer properties or its risks and benefits. Other factors, like socioeconomic status, access to healthcare, and psychological determinants that are known to affect adherence, were not investigated. Finally, the quality and accuracy of information shared by healthcare professionals and social media, major false information sources, were not assessed.

Public health efforts to raise awareness of aspirin as both an anti-cancer and anti-thrombotic agent should be prioritized, addressing these limitations and improving outcomes. Communications should leverage digital and social media as well as the trusted healthcare providers who play such an important role in reaching diverse populations. Integrating assistance tools such as reminders that come in handy on a smartphone and educational resources aimed at adherence could help improve this behavior.

Longitudinal designs are needed in future studies to evaluate causal relationships between awareness, adherence, and demographic variables. Adherence behaviors are more broadly defined when socioeconomic and psychological determinants and access to health care are included. Structured training programs for healthcare providers should focus on providing evidence-based communication in addressing patients' concerns. Moreover, studies should consist of various populations and geographical locations for better generalization of findings and to recognize contextual factors impacting aspirin use and adherence.

Conclusion

This study aimed to measure the Awareness of Aspirin's Dual Function as an Anti-Cancer Agent and Anti-Thrombotic among Residents of the Makkah region in the Kingdom of Saudi Arabia.

We found that the participants did not show adequate awareness and knowledge regarding the preventive impact of aspirin on colorectal cancer as well as its benefit as antithrombotic agent. Moreover, they demonstrated low adherence levels to aspirin use. Hence, the importance of conducting awareness campaigns and utilizing social media platforms to increase their knowledge and encourage them to take low-dose aspirin.

Statements:

Declaration of interest: no conflicts of interest to declare.

Funding sources: The authors have received no funding to conduct this study.

Data availability: All data related to this study is available upon request.

Author's contribution:

H.A did the study design, data collection, and writing. S.H. contributed to data collection, analysis, and writing. L.S did the data collection, writing, and reference management. R.A. did the data collection and discussion. A.B did the data collection and writing. Y.A. managed writing, manuscript review, and supervision.

References:

1. Vane JR, Botting RM. The mechanism of action of aspirin. *Thromb Res.* 2003 Jun;110(5–6):255–8.
2. DOI: [https://doi.org/10.1016/s0049-3848\(03\)00379-7](https://doi.org/10.1016/s0049-3848(03)00379-7)
3. Gaziano JM, Brotons C, Coppolecchia R, Cricelli C, Darius H, Gorelick PB, et al. Use of aspirin to reduce risk of initial vascular events in patients at moderate risk of cardiovascular disease (ARRIVE): a randomised, double-blind, placebo-controlled trial. *The Lancet.* 2018 Sep;392(10152):1036–46. doi:

- [https://doi.org/10.1016/S0140-6736\(18\)31924-X](https://doi.org/10.1016/S0140-6736(18)31924-X)
3. Bosetti C, Rosato V, Gallus S, Cuzick J, La Vecchia C. Aspirin and cancer risk: a quantitative review to 2011. *Annals of Oncology*. 2012 Jun;23(6):1403–15. Doi:<https://doi.org/10.1093/annonc/mds113>
 4. Chan AT, Arber N, Burn J, Chia WK, Elwood P, Hull MA, et al. Aspirin in the Chemoprevention of Colorectal Neoplasia: An Overview. *Cancer Prevention Research*. 2012 Feb 1;5(2):164–78. <https://doi.org/10.1158/1940-6207.capr-11-0391>
 5. Wheat HL, Irani E, Hughes J, Josephson R, Dolanksy MA. Insights from Monitoring Aspirin Adherence: A Medication Adherence Cascade Tool. *Patient Prefer Adherence*. 2021 Jul;Volume 15:1639–46. <https://doi.org/10.2147/ppa.s315296>
 6. Lloyd KE, Hall LH, Ziegler L, Foy R, Green SMC, MacKenzie M, et al. Acceptability of aspirin for cancer preventive therapy: a survey and qualitative study exploring the views of the UK general population. *BMJ Open*. 2023 Dec 18;13(12):e078703. <https://doi.org/10.1136/bmjopen-2023-078703>
 7. Morisky DE, Ang A, Krousel-Wood M, Ward HJ. Retracted: Predictive Validity of a Medication Adherence Measure in an Outpatient Setting. *The Journal of Clinical Hypertension*. 2008 May 2;10(5):348–54. doi: <https://doi.org/10.1111/j.1751-7176.2008.07572.x>.
 8. Ranger GS, McKinley-Brown C, Rogerson E, Schimp-Manuel K. Aspirin Use, Compliance, and Knowledge of Anticancer Effect in the Community. *Perm J*. 2020 Jun;24(2). <https://doi.org/10.7812/tpp/19.116>
 9. Cao Y, Nishihara R, Wu K, Wang M, Ogino S, Willett WC, et al. Population-wide Impact of Long-term Use of Aspirin and the Risk for Cancer. *JAMA Oncol*. 2016 Jun 1;2(6):762. <https://doi.org/10.1001/jamaoncol.2015.6396>
 10. Morgan G. Potential contribution of aspirin to cancer control programmes. *Ecancermedicalscience*. 2009 Jan 1;3. <https://doi.org/10.3332/ecancer.2008.100>
 11. Sarma EA, Rendle KA, Kobrin SC. Cancer symptom awareness in the US: Sociodemographic differences in a population-based survey of adults. *Prev Med (Baltim)*. 2020 Mar;132:106005. <https://doi.org/10.1016/j.ypmed.2020.106005>
 12. Southwell BG, Eder M, Finnegan J, Hirsch AT, Luepker R V, Duval S, et al. Use of online promotion to encourage patient awareness of aspirin use to prevent heart attack and stroke. *J Epidemiol Community Health (1978)*. 2018 Nov;72(11):1059–63. <https://doi.org/10.1136/jech-2018-210676>
 13. Duffy D, Kelly E, Trang A, Whellan D, Mills G. Aspirin for Cardioprotection and Strategies to Improve Patient Adherence. *Postgrad Med*. 2014 Jan 13;126(1):18–28. <https://doi.org/10.3810/pgm.2014.01.2721>
 14. Vora P, Soriano-Gabarró M, Russell B, Morgan Stewart H. Long-Term Adherence and Persistence to Low-Dose Aspirin for the Prevention of Cardiovascular Disease: A Population-Based Cohort Study. *Int J Clin Pract*. 2022 Dec 2;2022:1–9. <https://doi.org/10.1155/2022/7786174>
 15. Zhu J, Shi Y, Li J, Zhang Z. Role of risk attitude and time preference in preventive aspirin use adherence. *J Eval Clin Pract*. 2020 Jun 3;26(3):819–25. <https://doi.org/10.1111/jep.13274>
 16. Packard KA, Hilleman DE. Adherence to therapies for secondary prevention of cardiovascular disease: a focus on aspirin. *Cardiovasc Ther*. 2016 Dec 12;34(6):415–22. <https://doi.org/10.1111/1755-5922.12211>
 17. Haynes R, Yao X, Degani A, Kripalani S, Garg A, McDonald H. Interventions for enhancing medication adherence. In: Haynes RB, editor. *Cochrane Database of Systematic Reviews*. Chichester, UK: John Wiley & Sons, Ltd; 2005. <https://doi.org/10.1002/14651858.cd000011.pub2>

18. Kripalani S, Yao X, Haynes RB. Interventions to Enhance Medication Adherence in Chronic Medical Conditions. Arch Intern Med. 2007 Mar 26;167(6):540.
<https://doi.org/10.1001/archinte.167.6.540>
19. Vianna CA, González DA, Matijasevich A. Aspirin use in cardiovascular disease prevention: a population-based study. J Epidemiol Community Health. 2012 Jun;28(6):1122–32.
<https://doi.org/10.1590/s0102-311x2012000600011>