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RESEARCH ARTICLES

Pemberian Vaksin AstraZeneca terhadap Outcome Terapi pada Pasien Kardiovaskular

AstraZeneca Vaccine Administration and Treatment Outcomes in Cardiovascular Patients

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Abstract

Cardiovascular disease (CVD) is a leading cause of morbidity and mortality worldwide. With the global rollout of COVID-19 vaccines, including the AstraZeneca vaccine, there is increasing interest in understanding their impact on individuals with pre-existing cardiovascular conditions. While effective in preventing COVID-19, concerns have been raised about potential cardiovascular side effects. This study aimed to determine the correlation between the AstraZeneca vaccine and treatment outcomes in CVD patients, focusing on differences in patients' CVD-related conditions before and after vaccination. Data were collected using validated questionnaires conducted in Jakarta, employing an analytical survey with a cohort approach. Reliability was assessed using Cronbach's alpha, and validity was tested with a modified Delphi method involving clinical pharmacy experts. Data were analyzed using crosstab analysis via Chi-square test. The study included 200 subjects, with 115 females (57,5%) and 85 males (42,5%), with a majority of participants being over 45 years old (45,0%). A significant correlation (p-value < 0,05) was observed across various factors, including comorbidities and sociodemographic variables, patients' drug intake before and after vaccination, and the relationship between vaccination and comorbid diseases. The findings indicate a strong association between vaccination and patients history of cardiovascular disease. This correlation highlights the vaccine's possible impact on CVD-related symptoms post-vaccination. Consequently, the research provides evidence that the AstraZeneca vaccination significantly affects the risk of cardiovascular disease.

Keywords: *AstraZeneca vaccine, cardiovascular, correlation analysis*

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Abstrak

Penyakit kardiovaskular (CVD) merupakan salah satu penyebab utama morbiditas dan mortalitas di seluruh dunia. Dengan peluncuran vaksin COVID-19 secara global, termasuk vaksin AstraZeneca, minat untuk memahami dampak potensial vaksinasi pada individu dengan kondisi kardiovaskular yang sudah ada sebelumnya semakin meningkat. Meskipun vaksin ini terbukti efektif dalam mencegah COVID-19, ada kekhawatiran mengenai potensi efek sampingnya, termasuk masalah kardiovaskular. Penelitian ini dilakukan untuk menentukan apakah ada hubungan antara vaksin AstraZeneca dengan hasil pengobatan CVD dan melihat perbedaan penyakit terkait CVD pada pasien sebelum dan setelah menerima vaksinasi. Data dikumpulkan menggunakan kuesioner yang dilakukan di sekitar Jakarta. Penelitian ini menggunakan survei analitik dengan pendekatan kohort. Reliabilitas data yang diperoleh dinilai menggunakan *Alpha Cronbach*. Untuk uji validitas, digunakan metode *Delphi* yang dimodifikasi, melibatkan ahli farmasi klinis untuk memberikan umpan balik mengenai konstruksi kuesioner. Data akan dianalisis menggunakan analisis crosstab melalui uji *Chi-square*. Studi ini melibatkan 200 subjek, dengan 115 perempuan (57,5%) dan 85 laki-laki (42,5%), dan mayoritas peserta berusia di atas 45 tahun (45,0%). Korelasi yang signifikan (*p-value* < 0,05) diamati di berbagai faktor, termasuk komorbiditas dan variabel sosiodemografi, konsumsi obat pasien sebelum dan sesudah vaksinasi, dan hubungan antara vaksinasi dan penyakit komorbid. Terdapat hubungan yang kuat antara vaksinasi dan riwayat penyakit kardiovaskular pada pasien. Dampak potensial vaksin terhadap gejala terkait penyakit kardiovaskular setelah vaksinasi. Sebagai hasilnya, penelitian ini menawarkan bukti bahwa vaksin AstraZeneca secara signifikan mempengaruhi risiko penyakit kardiovaskular.

Kata Kunci: vaksin AstraZeneca, kardiovaskular, analisis korelasi,

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Highlight:

- The study found a significant correlation (p-value < 0,05) between AstraZeneca vaccine administration and cardiovascular (CVD) treatment outcomes. These findings indicate a strong association between vaccination and the patient's history of cardiovascular disease, highlighting the vaccine's potential impact on CVD-related symptoms post-vaccination.
- Data shows an increase in the number of subjects with a history of heart disease from 36,0% before vaccination to 53,0% after vaccination. Furthermore, there were significant increases in comorbid conditions, such as hypertension rising from 11,5% to 23,0% and stroke history increasing from 9,5% to 13,0% post-vaccination.
- There is a strong correlation between vaccination and patient drug intake, as many required more medication to manage their health post-vaccination. For example, the use of statin-class cholesterol medication rose from 10,0% to 19,0%, and the use of diuretic-class antihypertensives appeared in 11,5% of subjects only after they were vaccinated.

INTRODUCTION

The COVID-19 vaccine is a key strategy to curb the spread of the infection of SARS-CoV-2 (WHO, 2021). The administration of the Covid-19 vaccination has important benefits in stimulating the immune system, which plays a significant role in preventing or reducing the risk of being infected by the virus. Covid-19 vaccination requires several doses, with intervals of weeks or months, and it's done to boost a person's immune system in the face of COVID-19 infection (Ministry of Health, 2021).

COVID-19 vaccine has played a significant role in vaccination campaigns worldwide. Various measures have been taken to reduce COVID-19 infection rates, one of which is vaccination. Vaccination typically involves a weakened or inactivated component of a specific organism included in the vaccine to stimulate the immune system (Speiser dan Bachmann, 2020).

The decision to administer COVID-19 vaccines involves the entire population in each country, regardless of comorbid diseases or specific health conditions. This includes patients with cardiovascular disease who also receive the vaccine. Vaccines have the potential to reduce the severity and complications of SARS-CoV-2, including cardiovascular sequelae, especially in patients with a history of cardiovascular disease. Vaccines aimed at preventing COVID-19 can potentially mitigate the severity and complications, including cardiovascular impacts, particularly in patients with pre-existing cardiovascular conditions. Documented cases of myocarditis, pericarditis, and acute myocardial infarction (AMI) following vaccination with adenovirus vector vaccines have also been reported (Chen dan Su, 2023). Adenoviral vector covid-19 vaccines in rare cases may contribute to cardiovascular events. Vaccine Induced Immune Thrombotic Thrombocytopenia (VITT) activating platelets and promoting thrombosis with that vaccine components may trigger the formation of antibodies against platelet factor 4 (PF4). Endothelial activation from the adenoviral vector may increase vascular permeability and coagulation, intensify pro-inflammatory cytokine release increasing vascular permeability and coagulation cascades.

Recent reports have highlighted cardiovascular complications in individuals following COVID-19 vaccination. However, for most of these reports, the connection between vaccination and the complications has not been conclusively proven (Shiravi et al., 2021). Among the vaccines developed, the AstraZeneca vaccine has been widely used. According to the data from Indonesian national committee on adverse events following immunization (AEFI) and the ministry of health. AstraZeneca (Vaxzervria) accounted for 70,997,367 doses, representing 16,9% of all covid-19 vaccine doses administered nationally in Indonesia by June 2022 (Kaswandani et al., 2023).

The AstraZeneca vaccine works by utilizing a modified chimpanzee adenovirus DNA, which has not been previously exposed to humans. This adenoviral vector interacts with viral proteins encoded in the host's DNA. It carries genetic instructions to produce proteins resembling viral peptides, thereby eliciting an immune response against these peptides (Sette dan Crotty, 2021). This study was conducted to determine whether there are correlations between AstraZeneca vaccine with (CVD) treatment outcomes and looked at the differences of the patients's CVD-related disease, before and after receiving the vaccination.

METHODS

Determining the relationship between the administration of the AstraZeneca vaccine and treatment outcomes in cardiovascular patients that scheduled to last for three months, with data collection conducted in the area around Jakarta. This research employs an analytical survey with a cohort approach, prospectively and retrospectively (Trimawartinah, 2020). The process involves first identifying the risk factors, then examining the consequences within a specific period and tracing the effects back to their causes (Vionalita, 2020).

The dependent variables are the cardiovascular treatment outcomes and side effects. The independent variables include age, gender, weight, disease complications, and the AstraZeneca vaccine. includes 200 participants aged 18 and had a history of cardiovascular disease or were currently receiving treatment for cardiovascular-related conditions (hypertension, diabetes, cholesterol, gout, and stroke) with exclusion criteria encompass cancer patients, HIV/AIDS patients, individuals with a history of autoimmune diseases, and pregnant women. Data was gathered using validated questionnaires that were tested for reliability, achieving a *Cronbach's alpha* of over 0,7. The analysis will be conducted using SPSS 27, employing crosstab analysis with *Chi-square* test. Correlation will be determined with a significance level of *p-value* < 0,05. Ethical clearance (No.97/KEPK-UTA45JKT/EC) was issued by Universitas 17 Agustus 1945 Jakarta in June 2024.

RESULTS AND DISCUSSIONS

Pilot study

Validity test used to create an evaluation table that are reviewed by experts who act as validity testers. Based on the reviewers, the questionnaire is representative, relevant, have a clear statement, and off bias.

Table 1. Pilot study subjects characteristics (n = 30)

Characteristics	n (%)
Gender	
Men	11 (36,6%)
Women	19 (63,4%)
Age	
≤ 30	4 (13,3%)
≤ 45	10 (33,3%)
> 45	16 (53,4%)
Total	**30 (100,0%)**

Source: Primary data, 2024

The pilot test conducted reliability and validity analyses on 30 subjects (Table 1). There were 19 (63,4%) female subjects and 11 (36,6%) male subjects. The majority were aged <30 years 4 (13,3%), <45 years (10) (33,3%), and >45 years 16 (53,4%).

Table 2. Internal consistency reliability test

Item Statistics	Total Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Vaccination History					
Do you often feel tired after receiving the vaccine?	3	24,53	26,533	0,434	0,920
Do you often feel pain in the area around the chest and/or neck after receiving the vaccine?		24,60	25,834	0,643	0,916
Did you feel a headache/dizziness after receiving the vaccine?		24,40	26,386	0,424	0,921
History of Disease and Treatment Prior to First Vaccination					
Did a heart attack occur before vaccination?	7	24,70	26,148	0,726	0,915
What blood thinners medicine do you drink before vaccination?		24,67	26,161	0,652	0,916
What diabetes medication are you drinking before vaccination?		24,67	26,092	0,671	0,915
What high blood pressure medication did you take before vaccination?		24,70	27,321	0,385	0,920
Did you take cholesterol medication before vaccination?		24,60	25,834	0,643	0,916
Do you regularly take cholesterol medication before vaccination?		24,67	26,230	0,634	0,916
What gout medication did you take before vaccination?		24,70	26,148	0,726	0,915
The History and Treatment After Vaccination					
Do you have complications of heart disease after vaccination?	11	24,50	25,638	0,611	0,916
Did you take any medication for the		24,20	26,786	0,356	0,923

Item Statistics	Total Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
history of the disease after vaccination?					
Do you take blood thinning medication after vaccination?		24,63	25,620	0,740	0,914
Do you regularly use blood thinning medication after vaccination?		24,67	26,161	0,652	0,916
Do you take high blood pressure medication after vaccination?		24,60	26,869	0,399	0,921
What high blood pressure medication do you consume after vaccination?		24,63	26,723	0,462	0,919
Do you take diabetes medication after vaccination?		24,63	26,585	0,496	0,919
What diabetes medication are you taking after vaccination?		24,67	26,299	0,615	0,916
What cholesterol medication are you taking after vaccination?		24,60	25,766	0,660	0,915
How long have you been taking cholesterol medication after vaccination?		24,57	25,289	0,739	0,913
Do you regularly take gout medication after vaccination?		24,73	26,961	0,562	0,918

Source: Primary data, 2024

Internal consistency reliability test as seen in Table 2, it was noted that of the 69 questions tested, only 21 questions were considered valid based on the correlation score of the total correct items with a score > 0,3. The reliable questions consisted of: 3 (three) questions from the vaccination history instrument, 7 (seven) questions about the history of illness and treatment before the first immunization, 11 (one) questions about the history and treatment after vaccination. Analysis of the reliability of the

questionnaire in Table 3, there are 21 reliable items with a Cronbach alpha value of 0,921.

Table 3. Reliability analysis

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0,921	0,925	21

Source: Primary data, 2024

Sociodemography and vaccine history (n = 200)

The data used in this study (Table 4), by as many as 200 subjects was considered eligible for this study because it meets the inclusion and exclusion criteria. Among the subjects (Table 4) the majority were female 115 (57,5%) while the male subjects had a lower percentage 85 (42,5%) with a grouping of participants with age <30 (15,5%), age <45 (39,5%), and age >45 (45,0%). The most frequently employed subjects were 46 people with 23,0% as entrepreneurs, 6 people who were not employed (3,0%), 21 students (10,5%), 34 housewives (17%), 16 teachers (8,0%), 42 private employees (21,0%), and 35 health professionals (17,5%).

Table 4. Social demographic characteristics of the population

Variable	n	%
Age		
<30	31	15,5
<45	79	39,5
>45	90	45,0
Gender		
Male	85	42,5
Female	115	57,5
Job		
Unemployed	6	3,0
Private Employee	42	21,0
Student	21	10,5
Entrepreneur	46	23,0
Housewife	34	17,0
Teacher	16	8,0
Healthcare Professional	35	17,5
How many times have you received COVID-19 vaccines?		
2nd dose	21	10,5
3rd dose	101	50,5
4th dose	78	39,0
What second dose of vaccine did you get?		
Sinovac	17	8,5
Moderna	34	17,0
Pfizer	24	12,0
AstraZeneca	125	62,5
What third dose of vaccine did you get?		
Sinovac	17	8,5
Moderna	29	14,5

Variable	n	%
Pfizer	50	25,0
AstraZeneca	84	42,0
Didn't recieve	20	10,0
What fourth dose of vaccine did you get?		
Sinovac	16	8,0
Pfizer	28	14,0
AstraZeneca	38	19,0
Didn't recieve	118	59,0

Source: Primary data, 2024

Table 4 also shows that the subjects who received the second vaccine were only 21 (10,5%) whereas the third vaccine received 101 (50,5%) people, who received a fourth vaccine 78 people (39,0%). While the most received vaccine was the AstraZeneca vaccine at the second dose of 125 people (62,5%), at the third dose 84 people (42,0%), and for the fourth vaccination 38 people (19,0%).

Sociodemographic differences with cardiovascular disease before and after vaccination

The topic investigates the sociodemographic variations in individuals with cardiovascular disease, comparing data from before and after vaccination.

Table 5. Sociodemographic correlation with heart history

Variable	Before Vaccine		p-value	After Vaccine		p-value
	n	%		n	%	
Age						
<30	3	1,5	0,001*	4	2,0	0,001*
<45	28	14,0		36	18,0	
>45	41	20,5		66	33,0	
Gender						
Male	31	15,5	1,000	46	23,0	0,886
Female	41	20,5		60	30,0	
Job						
Private Employee	15	7,5	0,001*	27	13,5	0,001*
Student	2	1,0		3	1,5	
Entrepreneur	25	12,5		34	17,0	
Housewife	6	3,0		12	6,0	
Teacher	7	3,5		12	6,0	
Healthcare Professional	17	8,5		24	12,0	
Vaccine Dose						
Recieved only 2nd dose	4	2,0	0,241	7	3,5	0,150
Recieved only 3rd dose	38	19,0		57	28,5	
Recieved only 4th dose	30	15,0		42	21,0	

Note: *Chi-square test, significant if p-value < 0,05

From Table 5, it was found that participants with a history of heart disease before and after receiving the vaccine were as follows: age <30 (1,5% vs 2,0%), age <45 (14,0% vs 18,0%), age >45 (20,5% vs 30,0%), with the percentage of male subjects

(15,5% vs 23,0%) and female subjects (20,5% vs 30,0%). There was also an increase in the percentage of patients with a history of heart disease based on their occupation and the number of vaccine doses received. There was a significant correlation between sociodemographic factors such as age and occupation in patients with a history of heart disease ($p < 0,005$), while there was no correlation between gender and the number of vaccine doses received.

Sociodemographic differences with comorbidity before and after vaccination

Sociodemographic variations in individuals were investigated with a history of comobidity, comparing data from before and after vaccination.

Table 6. Sociodemographic correlation with comorbidity

Variable	Before Vaccine		p-value	After Vaccine		p-value
	n	%		n	%	
Age						
<30	6	3,0	0,001*	10	5,0	0,001*
<45	41	20,5		55	27,5	
>45	54	27,0		80	40,0	
Gender						
Male	47	23,5	0,256	64	32,0	0,769
Female	54	27,0		81	40,5	
Job						
Private Employee	21	10,5	0,069	30	15,0	0,522
Student	6	3,0		8	4,0	
Entrepreneur	28	14,0		40	20,0	
Housewife	15	7,5		25	12,5	
Teacher	11	5,5		11	5,5	
Healthcare Professional	20	10,0		31	15,5	
Vaccine Dose						
Recieved only 2nd dose	7	3,5	0,083	16	8,0	0,849
Recieved only 3rd dose	58	29,0		74	37,0	
Recieved only 4th dose	36	18,0		55	27,5	

Note: *Chi-square test, significant if p-value < 0,05

From the data obtained (Table 6), it was found that participants with a history of heart disease before and after receiving the vaccine were as follows: age <30 (3,0% vs 5,0%), age <45 (20,5% vs 27,5%), age >45 (27,0% vs 40,0%), with the percentage of male subjects (23,5% vs 32,0%) and female subjects (27,0% vs 40,5%). It can be observed that there is an increase in percentage from before vaccination to after vaccination. Furthermore, there is only a correlation between age and comorbidities with *p-value* < 0,05.

Correlation of cardiovascular disease before and after vaccination

Table 7 shows an analysis of the correlation between the prevalence and post-vaccination correlations between the number of subjects who had a cardiovascular history prior to vaccination of 72 (36,0%) and 106 (53,0%) after vaccination and 128 (64,0%) who had no cardiovascular history before vaccination with 94 (47,0%).

Table 7. History of heart disease before and after vaccination

Variable	Before Vaccine		After Vaccine		p-value
	n	%	n	%	
Riwayat penyakit jantung					
Don't have	128	64,0	94	47,0	0,001*
Have	72	36,0	106	53,0	
How long do you have CVD?					
< 1 year	40	20,0	57	28,5	
> 1 year–5 years	27	13,5	48	24,0	0,001*
> 5 years	4	2,0	0	0,0	

Note: *Chi-square test, significant if p-value < 0,05

Examining (Table 7) the duration of cardiovascular disease among patients, the differences before and after vaccination are as follows: patients with cardiovascular disease for less than 1 year were 40 (20,0%) before vaccination and 57 (28,5%) (noted as a percentage increase post-vaccination), those with cardiovascular disease for 1 to 5 years were 27 (13,5%) before vaccination and 48 (24,0%) after vaccination, and those with cardiovascular disease for more than 5 years were 4 (2,0%) before vaccination. The *Chi-square* statistical test yielded a *p-value* of 0,001. This indicates a significant relationship between vaccination and the history of cardiovascular disease in patients (*p-value* < 0,05).

Correlation of comorbidity before and after vaccination

An analysis of the correlation between the prevalence of heart disease before and after vaccination is shown in Table 8, it reveals that 43 subjects (21,5%) had diabetes as a comorbidity before vaccination, increasing to 49 subjects (24,5%) after vaccination. Additionally, 68 subjects (34,0%) had cholesterol before vaccination, which rose to 75 subjects (37,5%) after vaccination. For hypertension, 23 subjects (11,5%) had it before vaccination, compared to 46 subjects (23,0%) after vaccination. The number of subjects with gout as a comorbidity increased from 44 (22,0%) before vaccination to 50 (25,0%) after vaccination. Finally, 19 subjects (9,5%) had a history of stroke before vaccination, which increased to 26 subjects (13,0%) after vaccination.

Table 8. Comorbidity before and after vaccination

Variable	Before Vaccine		After Vaccine		p-value
	n	%	n	%	
Diabetes					
Don't have	157	78,5	151	75,5	0,001*
Have	43	21,5	49	24,5	
Cholestrol					
Don't have	132	66,0	125	62,5	0,001*
Have	68	34,0	75	37,5	
Hypertension					
Don't have	177	88,5	154	77,0	0,001*
Have	23	11,5	46	23,0	
Gout					
Don't have	156	78,0	150	75,0	0,001*
Have	44	22,0	50	25,0	
Stroke					0,001*

Variable	Before Vaccine		After Vaccine		p-value
	n	%	n	%	
Don't have	281	140,5	174	87,0	
Have	19	9,5	26	13,0	

Note: *Chi-square test, significant if p-value < 0,05

The *Chi-square* statistical test yielded a *p-value* of 0,001. This indicates a significant relationship between vaccination and the comorbidity disease in patients (*p-value* < 0,05).

Correlation of drug intake before and after vaccination

Comorbidity related to drug use (Table 9), by examining between drug intake and vaccination status by comparing data from table 7 can be seen that subjects that subjects with a history of stroke consumed antiplatelets with 37 people (18,5%) before vaccination and 44 people (22,0%) after vaccination. Anticoagulants were used by 34 people (17,0%) before vaccination and 41 people (20,5%) after vaccination.

Subjects with diabetes consumed glitazone with 9 people (4,5%) before vaccination and 12 people (6,0%) after vaccination, metformin with 14 people (7,0%) before vaccination and 21 people (10,5%) after vaccination, sulfonylurea with 7 people (3,5%) before vaccination and 8 people (4,0%) after vaccination, gliptin with 4 people (2,0%) before vaccination and 5 people (2,5%) after vaccination, and incretin mimetics with 5 people (2,5%) before vaccination and 6 people (3,0%) after vaccination.

There were 23 subjects (11,5%) who took diuretic-class antihypertensive medications after being vaccinated. Six individuals (3,0%) prior to vaccination and ten individuals (5,0%) following vaccination were among those who took calcium channel blockers. Six responders (3,0%) and seven (3,5%) of the subjects had taken ACE inhibitors prior to and following vaccination. Lastly, 7 individuals (3,5%) who used Angiotensin II Receptor Blockers prior to vaccination and 6 individuals (3,0%) following vaccination were among those who did so.

Subjects who consumed cholesterol-lowering medications in the statin class numbered 20 people (10,0%) before vaccination and 38 people (19,0%) after vaccination. Those who consumed ezetimibe included 8 people (4,0%) both before and after vaccination, subjects who took bile acid sequestrants was 10 people (5,0%) before and after vaccination. Additionally, 6 people (3,0%) consumed fibrates before vaccination, while 10 people (5,0%) consumed them after vaccination.

NSAID users were among the subjects who took gout medication; 7 individuals (3,5%) did so prior to vaccination, and 18 individuals (9,0%) did so following vaccination. Four people (2,0%) and eight persons (4,0%), respectively, used corticosteroids prior to and following vaccination. Ten (5,0%) of the subjects took allopurinol prior to vaccination, while eleven (5,5%) did so subsequently. A 0,001 *p-value* was obtained via the *Chi-square* statistical test. Based on the patients' drug intake before vaccination and after vaccination, there is a strong correlation between vaccination and the condition (*p-value* < 0,05).

Examined correlation between AstraZeneca vaccination and treatment outcomes in patients with cardiovascular disease (CVD) whilst the analysis of patients' medication use before and after vaccination shows that vaccination and the presence of comorbid diseases had a significant relationship to post-vaccination cardiovascular treatment outcomes.

Table 9. Drug intake before and after vaccination

Variable		Before Vaccine n	Before Vaccine %	After Vaccine n	After Vaccine %	p-value
Stroke						
Drugs Classification	Antiplatelet	37	18,5	44	22,0	0,001*
	Anticoagulants	34	17,0	41	20,5	
Long-term use	< 1 year	52	26,0	53	26,5	
	> 1 year – 5 years	19	9,5	30	15,0	0,001*
	> 5 years	0	0,0	0	0,0	
Medicine consumption compliance	Rarely	17	8,5	19	9,5	0,001*
	Routine	54	27,0	64	32,0	
Diabetes						
Drugs Classification	Glitazone	9	4,5	12	6,0	
	Metformin	14	7,0	21	10,5	
	Sulfoniurea	7	3,5	8	4,0	0,001*
	Gliptin	4	2,0	5	2,5	
	Inkretin minetik	5	2,5	6	3,0	
Long-term use	< 1 year	16	8,0	21	10,5	
	> 1 year – 5 years	23	11,5	29	14,5	0,001*
	> 5 years	0	0,0	0	0,0	
Medicine consumption compliance	Rarely	8	4,0	7	3,5	0,001*
	Routine	32	16,0	44	22,0	
Hypertension						
Drugs Classification	Diuretic	0	0.0	23	11,5	
	Calcium Channel Blocker	6	3,0	10	5,0	0,001*
	ACE Inhibitor	6	3,0	7	3,5	
	Angiotensin II receptor blocker	7	3,5	6	3,0	
Long-term use	< 1 year	12	6,0	12	6,0	
	> 1 year – 5 years	6	3,0	34	17,0	0,001*
	> 5 years	1	0,5	0	0,0	
Medicine consumption compliance	Rarely	0	0,0	0	0,0	0,001*
	Routine	19	9,5	46	23,0	
Cholesterol						
Drugs Classification	Statin	20	10,0	38	19,0	
	Ezetimibe	8	4,0	8	4,0	
	Bile Acid Sequestrant	10	5,0	10	5,0	0,001*
	Fibrat	6	3,0	10	5,0	
Long-term use	< 1 year	23	11,5	42	21,0	
	> 1 year – 5 years	24	12,0	28	14,0	0,001*
	> 5 years	0	0,0	0	0,0	
Medicine consumption compliance	Rarely	9	4,5	28	14,0	0,001*
	Routine	35	17,5	39	19,5	
Gout						
Drugs Classification	NSAID	7	3,5	18	9,0	
	Kortikosteroid	4	2,0	8	4,0	0,001*
	Allopurinol	10	5,0	11	5,5	
Long-term use	< 1 year	13	6,5	25	12,5	0,001*

Variable		Before Vaccine		After Vaccine		p-value
		n	%	n	%	
	> 1 year – 5 years	8	4,0	13	6,5	
	> 5 years	1	0,5	0	0,0	
Medicine consumption compliance	Rarely	4	2,0	15	7,5	0,001*
	Routine	18	9,0	23	11,5	

Note: *Chi-square test, significant if p-value < 0,05

Post-vaccination adjustments in cardiovascular medication are linked primarily to blood-pressure control, lipid profile, and glycemic status, identifying these parameters as key drivers of treatment changes. Pre-existing comorbidities, such as diabetes, hypertension, and hyperlipidemia are critical determinants of outcomes Buddeke et al. (2019); Abbas et al. (2020); Arif et al. (2022), while sociodemographic factors including age, frailty, obesity, and diabetes further heightened risk (Rodgers et al., 2019).

Transient inflammatory response that briefly affects vascular tone and coagulation in susceptible individuals can be triggered by the non-replicating adenoviral vector vaccines (Liu et al., 2022). By looking at the patients' medication, immune activation interacting with ACE2-mediated regulation of the renin angiotensin aldosterone system (Varga et al., 2020), ought to explain the fluctuations in post-vaccination patients' blood pressure, lipid levels, or glucose control.

Whereas the vaccine does not independently cause cardiovascular disease, it may temporarily interact with existing CVD risk factors, underscoring the need for careful monitoring of patients with poorly controlled hypertension, diabetes, or dyslipidemia during vaccination and follow-up.

CONCLUSIONS

The research focusing comparing the pre and post vaccination changes in cardiovascular related comorbidity whilst investigating relationships between the AstraZeneca vaccine and the impact on symptoms related to cardiovascular disease. The observed highlights are the vaccine's possible impact on symptoms related to cardiovascular disease after vaccination looking at the increasing drug intake post-vaccination. Thus, the vaccination acted as an independent cause of cardiovascular disease that interact with existing cardiovascular risks to influence treatment outcomes. Potential effects of vaccination on some clinical parameters did not demonstrate a definitive impact across all outcomes. For understanding how vaccination can affect the management and progression of cardiovascular health, future additional research should be done for further explorations of the vaccination mechanisms on cardiovascular health to improve therapeutic approaches and patient outcomes in vaccinated populations.

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CONFLICT OF INTEREST (special english article)

The author(s) declare that they have no conflict interest

REFERENCES

Abbas, M., Malicke, D.T., Schramski, J.T., 2020. Stroke Anticoagulation (Archived). StatPeals Publishing, New York.

Arif, Y., Stefanko, A., Garcia, N.J., Beshai, D., Fan, W., Wong, N.D., 2022. Relation of 10-Year Ascvd Risk Score with Severe Covid-19 Outcomes. Journal of The American College of Cardiology 79(9), 1-12. Doi:Https://Doi.Org/10.1016/S0735-1097(22)02839-X=[=[\

Buddeke, J., Bots, M.L., Dis, I.V., Visseren, F.L., Hollander, M., Schellevis, F.G., Vaartjes, I., 2019. Comorbidity in Patients with Cardiovascular Disease in Primary Care: A Cohort Study with Routine Healthcare Data. British Journal of General Practice 69(683), E398–E406. DOI: https://doi.org/10.3399/bjgp19X702725

Chen, C.Y., Su, T.C., 2023. Benefits and Harms of Covid-19 Vaccines in Cardiovascular Disease: A Comprehensive Review. Journal of Lipid and Atherosclerosis 12(2), 119–119. Doi:Https://Doi.Org/10.12997/Jla.2023.12.2.119

Kaswandani, N., Medise, B.E., Leonard, E., Satari, H.I., Sundoro, J., Hadinegoro, S.R.H., Putra, A., Angkasa, P.F., 2023. Safety Profile of Inactivated Covid-19 in Healthy Adults Aged ≥ 18 Years: A Passive Surveillance in Indonesia. Plos One 18(10), 1-22. Doi:Https://Doi.Org/10.1371/Journal.Pone.0286484

Liu, R., Pan, J., Zhang, C., Sun, X., 2022. Cardiovascular Complications of Covid-19 Vaccines. Frontiers in Cardiovascular Medicine 9, 1-7. Doi:Https://Doi.Org/10.3389/Fcvm.2022.840929

Ministry of Health., 2021. Clinical Guidelines on Covid-19 Vaccination in Malaysia 4th Edition. Ministry of Health Malaysia, Kuala Lumpur.

Rodgers, J.L., Jones, J., Bolleddu, S.I., Vanthenapalli, S., Rodgers, L.E., Shah, K., Karia, K., Panguluri, S.K., 2019. Cardiovascular Risks Associated with Gender and Aging. Journal of Cardiovascular Development and Disease 6(2), 1-18. Doi:Https://Doi.Org/10.3390/Jcdd6020019

Sette, A., Crotty, S., 2021. Adaptive Immunity to Sars-Cov-2 and Covid-19. Cell 184(4), 861–880. Doi:Https://Doi.Org/10.1016/J.Cell.2021.01.007

Shiravi, A.A., Ardekani, A., Sheikhbahaei, E., Heshmat-Ghahdarijani, K., 2021. Cardiovascular Complications of Sars-Cov-2 Vaccines: An Overview. Cardiology and Therapy 11(1), 13-21. Doi:Https://Doi.Org/10.1007/S40119-021-00248-0

Speiser, D.E., Bachmann, M.F., 2020. Covid-19: Mechanisms of Vaccination and Immunity. Vaccines 8(3), 1-19. Doi:Https://Doi.Org/10.3390/Vaccines8030404

Trimawartinah, T., 2020. Bahan Ajar Statistik Non Parametrik. [Modul]. Universitas Muhammadiyah Prof. Dr. Hamka, Jakarta.

Varga, Z., Flammer, A.J., Steiger, P., Haberecker, M., Andermatt, R., Zinkernagel, A.S., Mehra, M.R., Schuepbach, R.A., Ruschitzka, F., Moch, H., 2020.

Endothelial Cell Infection and Endotheliitis in Covid-19. The Lancet 395(10234), 1417-1418. Doi:Https://Doi.Org/10.1016/S0140-6736(20)30937-5

Vionalita, G., 2020. Modul Metodologi Penelitian Kuantitatif (KSM361) Materi 4 Kerangka Konsep dan Defenisi Operasional. Universitas Esa Unggul, Jakarta.

[WHO] World Health Organization., 2021. WHO-Convened Global Study of Origins of Sars-Cov-2: China Part [WWW Document]. https://www.who.int/Publications/I/Item/Who-Convened-Global-Study-Of-Origins-Of-Sars-Cov-2-China-Part. [Diakses Mei 2025].