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Research Article

**FREQUENCY OF RISK FACTORS ASSOCIATED WITH ST
ELEVATION MYOCARDIAL INFARCTION**¹Dr. Kiran Aziz, ²Dr. Iffat Rehman, ³Dr. Qudsia Zubair¹Ayub Medical College, Abbottabad²Punjab Medical College, Faisalabad³Nishter Medical Collage, Multan**Abstract**

Objective: To find out the frequency of risk factors associated with STEMI patients admitted in the Cardiology unit of Holy Family Hospital Rawalpindi.

Materials and Methods: A hospital based cross-sectional study was conducted between December 2017 and July 2018 in the Cardiology unit of Holy Family Hospital Rawalpindi. A total of 105 patients were interviewed. The sampling technique used was non-probability convenient sampling. All the patients were interviewed about the presence or absence of risk factors. Risk factors like diabetes mellitus, hypertension, obesity, stress and lifestyle were included. Data was analyzed using IBM SPSS version 23.

Results: Out of 105 patients, 79% were STEMI patients and 20.9% were Non-STEMI patients. Mean age was 60.50 ± 11.992 years. Mean \pm SD of age for STEMI was 61.55 ± 11.513 and mean \pm SD of age for Non-STEMI was 56.50 ± 13.172 . The difference between the mean age of STEMI and Non-STEMI was not statistically significant. (p value=0.079). Males were 60.2% and females were 39.8%. Out of the STEMI patients, 36.1% had positive family history of STEMI, 27.7% were smokers, 63.9% were hypertensive, 28.9% were diabetics, 69.9% had sedentary lifestyle, 24.1% had the history of stress, 39.8% did not consume fruits regularly and 20.5% were obese. None of the factors was found to be statistically significant.

Conclusions: Mean age of the STEMI patients was higher than that of Non-STEMI patients. The most common risk factor was sedentary life style followed by hypertension and family history of STEMI. The least frequent risk factor was obesity. There was no association of any factor with STEMI.

Key Words: ST elevation myocardial infarction, Non-ST elevation myocardial infarction, risk factors.

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INTRODUCTION:

Acute myocardial infarction (AMI) is the major cause of morbidity and mortality in developing countries. ST elevation myocardial infarction (STEMI) is the important public health problem in well developed countries and is also an emerging problem in developing countries. [1]

STEMI belongs to the group of heart conditions known as acute coronary syndrome (ACS). ACS consists of STEMI, Non-ST segment elevation myocardial infarction (NSTEMI) and unstable Angina.[2] STEMI is defined as : “Chest pain with ST elevation > 1mm in ≥ 2 contiguous leads or new onset of left bundle branch block with positive biomarkers”. [3] 12-lead electrocardiogram (ECG) and cardiac enzymes, especially, troponins are the standard for diagnosis of STEMI.[4] After the onset of ischemia, more than half of the patients with STEMI will die within 24 hours and many of them will suffer remarkable morbidity.[5] Complete and persistent occlusion of coronary artery by blood clot (thrombus) leads to STEMI. When the interruption of coronary blood supply occurs, myocardial damage begins. The extent of damage determines the pumping ability of heart. [6]

Factors which help in the diagnosis of STEMI include previous history of coronary artery disease, radiation of pain to the neck and lower jaw or left arm. Some patients present with atypical symptoms such as shortness of breath, nausea, vomiting, fatigue, palpitations or syncope. [7]

In Pakistan, a study carried out in the Emergency room of 17 cardiac care units (CCUS) from all the four provinces showed that 40.5% of the patients of ACS were having STEMI. [8] Most of the population of Pakistan lives in rural areas and that's why rural areas are the major contributors in the burden of heart diseases. [9] A study carried out in KPK Pakistan showed that STEMI constituted 46% of the total ACS presentations. [1]

The risk factors which predisposes to AMI including STEMI are divided into modifiable and non-modifiable. Modifiable risk factors include hypertension, diabetes, high blood cholesterol, smoking, physical inactivity and obesity. Non-modifiable risk factors include age, sex and family history of heart diseases. In Pakistan, the risk factors for ischemic heart disease (IHD) and acute myocardial infarction (AMI) are on rise. [10]

The common causes of ST-segment elevation includes early repolarization pattern, normal male-pattern ST-changes, Left ventricular hypertrophy, left

bundle branch block, pericarditis and ventricular aneurysm. [11] The rare cause of ST elevation includes acute myocarditis, brugada syndrome, stress-induced cardiomyopathy, aortic dissection, myocardial bridge and coronary spasm. In Far East countries the prevalence of coronary spasm is higher than in West. [12]

During 2008, 57 million deaths occurred in the world and 36 million out of them were due to non-communicable diseases (NCD). [13] 60% of the world's mortality and approximately 43% of the world's burden of disease is due to NCDs. Cardiovascular diseases were the main cause of NCDs deaths, globally in 2008 (17 million deaths or 43%). [14] In high income countries, during the last several decades, the rates of CVD related deaths have been decreased whereas the burden in low- and middle-income countries is 80%. [15] In low, middle- and high-income countries, ischemic heart disease is the top most cause of death in adults. [16] In 2015, about 15.9 million cases of myocardial infarction occurred globally. More than 3 million people had STEMI and 4 million people had NSTEMI in the world. [7] The incidence of STEMI is decreasing and NSTEMI is increasing, globally. [10]

Conventional risk factors for STEMI includes male sex, smoking and family history of cardiovascular disease. [17] Non-modifiable risk factors include old age and gender. Male sex is an important risk factor in young patients. [5] Modifiable risk factors include Diabetes mellitus, Hypertension, smoking and low-density lipoprotein C (LDL-C). Relative risk of myocardial infarction is increased 2-fold to 3 fold in patients with diabetes. [18] Risk of cardiovascular disease increases progressively at blood pressure above 110/75 mmHg. Increase in LDL-C increases coronary events while HDL decreases coronary even [19]

The clinical events and outcomes of STEMI are predicted by time-to-reperfusion. Conditions with chest pain and ST elevation should not be immediately provided reperfusion because ST elevation also occurs without STEMI. [20] Myocardial dysfunction is the most important complication associated with STEMI. Left ventricular dysfunction, particularly left ventricular systolic dysfunction, left ventricular aneurysm and left ventricular thrombus are the common complications associated with STEMI. [21]

In STEMI, treatment includes restoration of blood supply to heart. The treatment includes Primary Percutaneous Coronary Intervention (PCI), thrombolysis and rarely coronary artery bypass

grafts. [22] Pre procedural coronary complications are reduced by administration of glycoprotein antagonists and bivalirudin can be used for same purpose with less bleeding. [23] Beta blockers, angiotensin-converting-enzyme inhibitors and statins can be indicated in patients with STEMI, although beta blockers are contraindicated in patients at risk of cardiac shock. [24]

The results of our study can help the hospital management to allow better planning about the STEMI patients. The results can also help hospital to provide knowledge and awareness among the patients about the risk factors and the hospital management can help allocate proper funds for the STEMI patients.

MATERIAL AND METHODS:

It was a cross sectional study done in cardiology unit Holy family hospital Rawalpindi in December 2017 to July 2018. sample size was of 105 patients of myocardial infarction. We used Non-probability convenience sampling technique. Sample selection

was done on the basis of inclusion and exclusion criteria

A structured questionnaire was developed which included several study variables. The questionnaire was evaluated before finalizing it. Interview based questionnaire was filled after taking informed consent from all the subjects. The purpose of study was explained to the subjects and they were ensured that their data would be kept confidential.

Data was entered into the computer using IBM SPSS version 23.0. Categorical variables like socioeconomic status, education, smoking status were described in terms of frequencies and percentages. Continuous variables like age, income, duration of hypertension were described in terms of Mean \pm SD. Association between categorical variables was determined by using Chi-Square test. P. value of 0.05 or less was considered as statistically significant. T test was used to compare means of quantitative variables.

RESULTS:

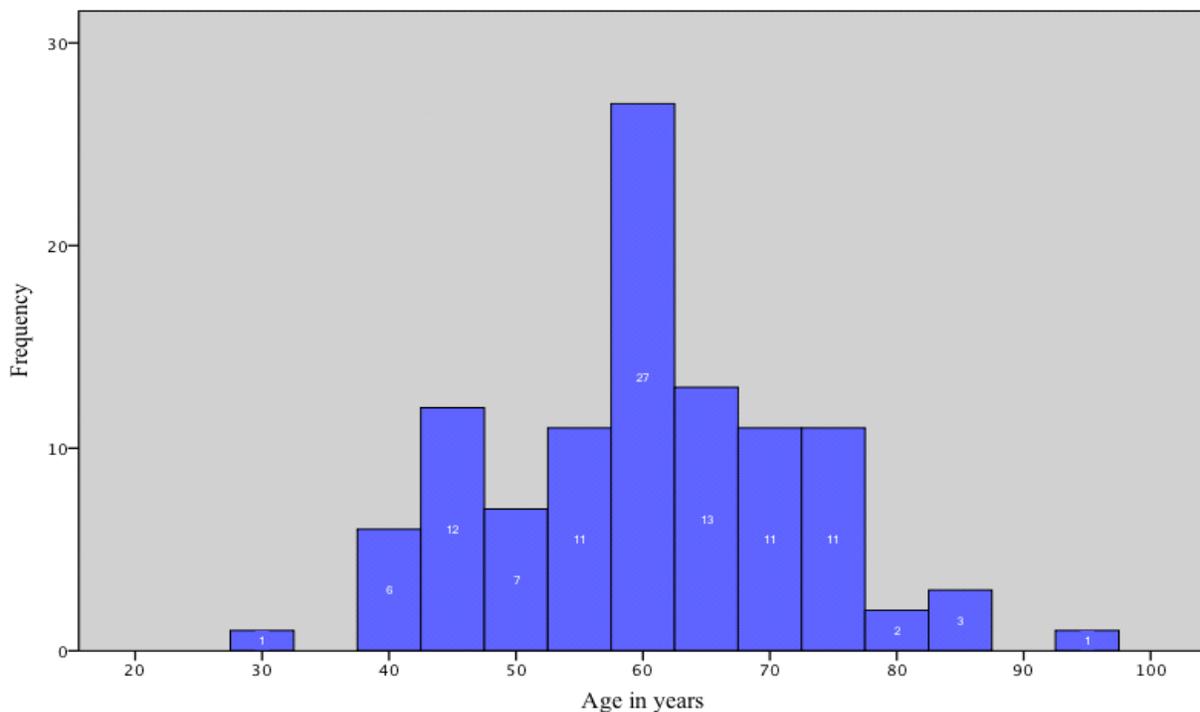


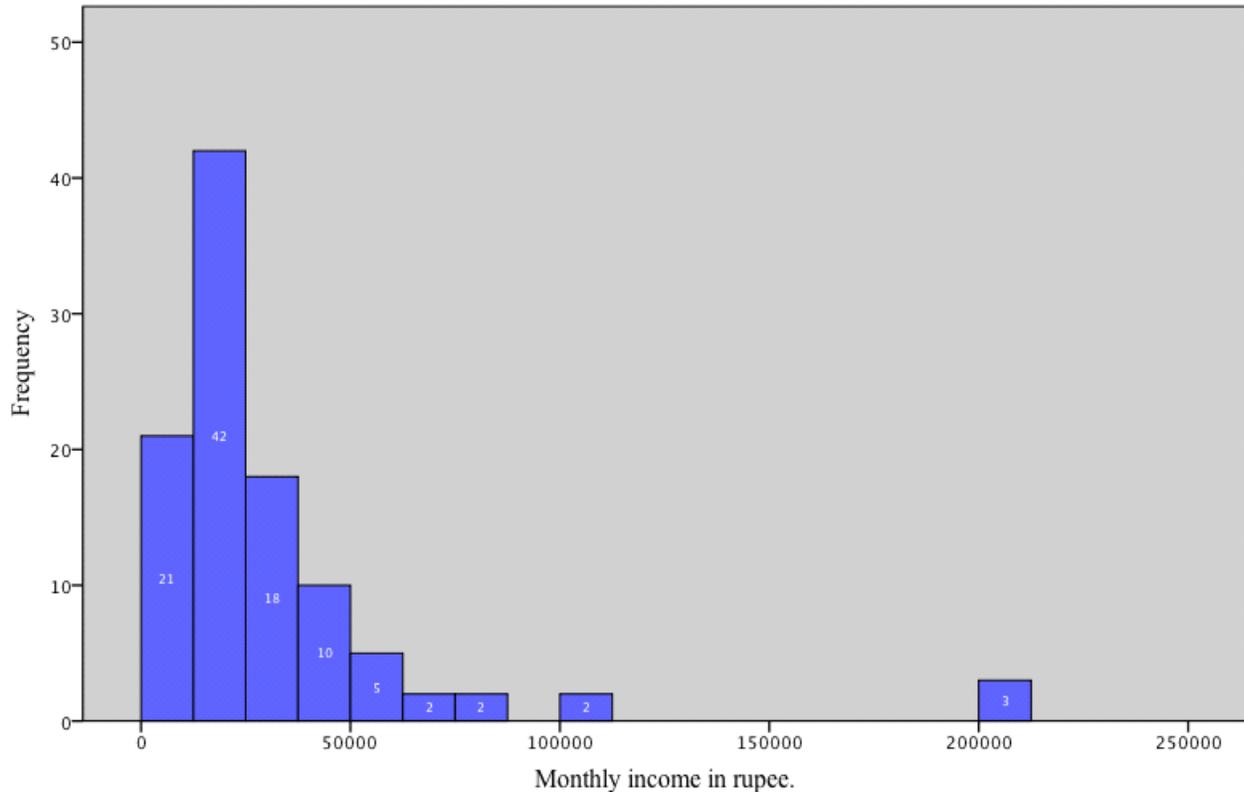
Figure 1: Age of patient in years.

We interviewed 105 patients belonging to various ages. The above histogram shows age in years. Minimum age was 30 years. Maximum age was 95 years. Range was 65 years. Mean age was 60.50 ± 11.992 years. Mean \pm SD for age of STEMI is 61.55 ± 11.513 , and mean \pm SD for age of Non-STEMI was 56.50 ± 13.172 . However the difference between the mean of age of patients with STEMI and Non-STEMI was statistically not significant. (p value 0.079).

Table1: Age groups.

Age group	Frequency	Percent
Up to 40 years	6	5.7
41 to 60 years	53	50.5
Above 60 Years	46	43.8
Total	105	100

The above table of age groups shows that in a sample of 105 patients, the frequency of MI was highest among those who were aged between 41 to 60 years with 53 (50.5%) patients, while it was least among those who were aged below 41 years with 6 (5.7%) patients

**Figure 2 Monthly income of patients in Pakistani Rupees.**

We collected data from 105 patients who had different monthly incomes. The above histogram shows monthly income of patients in Pakistani rupees. Minimum income was 5000 rupees. Maximum income was 200000 rupees. Range was 195000 rupees. Median income was 20000 rupees with interquartile range of 15000 rupees.

Table2: Socioeconomic status of patients.

Socioeconomic status	Frequency	Percent
Poor	75	71.4
Satisfactory	21	20.0
Good	9	8.6
Total	105	100

This table shows that in a sample of 105 patients, 75 (71.4%) had poor socioeconomic status, 21 (20.0%) had satisfactory socioeconomic status and 9 (8.6%) had good socioeconomic status. Patients having monthly income less than 30,000 were considered poor, between 30,000 and 60,000 were considered satisfactory and above 60,000 were considered having good socioeconomic status.

Table3: Type of Myocardial Infarction.

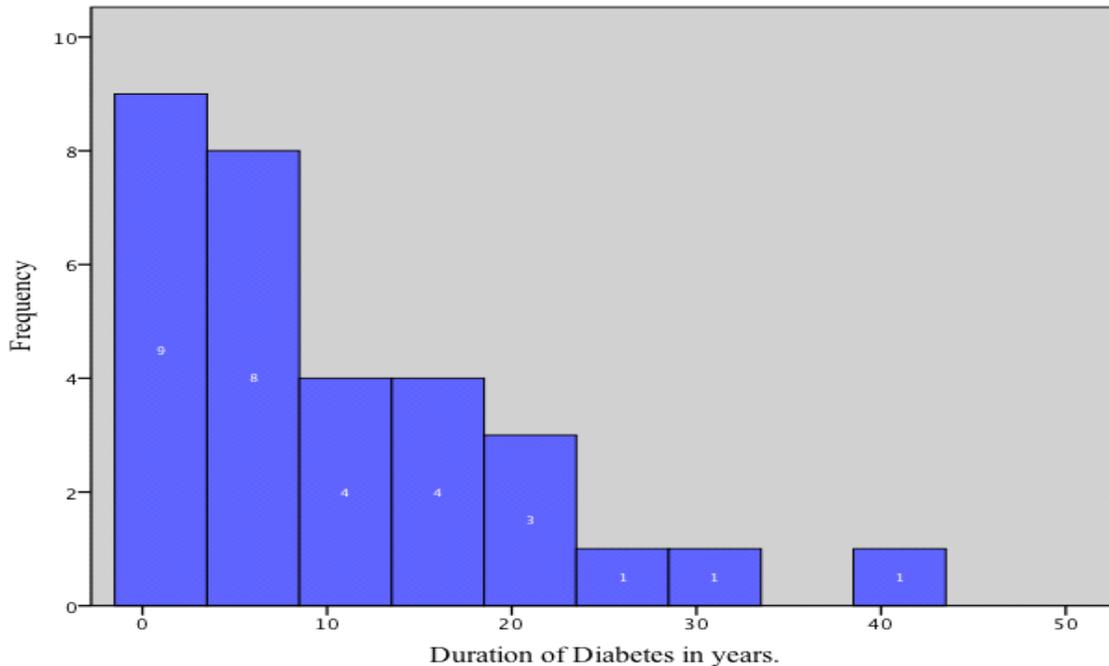
Type of MI	Frequency	Percent
STEMI	83	79.0
Non-STEMI	22	21.0
Total	105	100

The table above demonstrates that in a sample of 105 patients, 83 (79.0%) had STEMI and 22 (21.0%) had Non-STEMI.

Table4: Previous history of Myocardial Infarction.

Previous History of MI	Frequency	Percent
No previous history	66	62.9
One attack	30	28.6
More than one attack	9	8.6
Total	105	100

The above table shows that in a sample of 105 patients, 66 (62.9%) had no previous history of MI, 30 (28.6%) had history of one previous attack of MI and 9 (8.6%) patients had history of more than one previous attack of MI.

**Figure 3 Duration of diabetes in years.**

This histogram represents duration of diabetes in years. Minimum duration was 1 year. Maximum duration was 39 years. Range was 38 years. Mean duration was 10.06 ± 9.616 years. Median duration was 6 years with interquartile range of 13 years. Duration of diabetes in STEMI was 7.54 ± 7.425 and Non-STEMI was 18.71 ± 11.757 . The difference between them was significant. (p value=0.005).

Table5: Association of Cigarette smoking status with STEMI.

Cigarette smoking status	Type of Myocardial Infarction		Total
	STEMI	Non STEMI	
Never smoked	60(72.3%)	15(68.2%)	75(71.4%)
Smoker	23(27.7%)	7(31.8%)	30(28.6%)
Total	83(100%)	22(100%)	105(100%)

Out of the 83 patients of STEMI shown in the table, 60(72.3%) never smoked while 23(27.7%) were smokers. p value is 0.792, so no association has been found.

Table6: Association of Hypertension with STEMI.

Hypertension	Type of Myocardial Infarction		Total
	STEMI	Non STEMI	
Present	53(63.9%)	14(63.6%)	67(63.8%)
Absent	30(36.1%)	8(36.4%)	38(36.2%)
Total	83(100%)	22(100%)	105(100%)

In the table stated above, hypertensive patients were 53(63.9%) and non hypertensives were 30(36.1). total STEMI patients were 83. p value calculated was 1.000 which is statistically insignificant.

Table7: Association of Diabetes with STEMI.

Diabetes	Type of Myocardial Infarction		Total
	STEMI	Non STEMI	
Present	24(28.9%)	7(31.8%)	31(29.5%)
Absent	59(71.1%)	15(68.2%)	74(70.5%)
Total	83(100%)	22(100%)	105(100%)

In table 18, total STEMI patients were 83 and diabetic and non-diabetic patients were 24(28.9%) and 59(71.1%) respectively. p value is 0.797, which shows that diabetes is not a risk factor

Table8: Association of stress with STEMI.

Stress	Type of Myocardial Infarction		Total
	STEMI	Non STEMI	
Present	20(24.1%)	4(18.2%)	24(22.9%)
Absent	63(75.9%)	18(81.8%)	81(77.1%)
Total	83(100%)	22(100%)	105(100%)

Stress was present in 20(24.1%)patients while 63(75.9%) had no stress.Total STEMI patients were 83 as shown in the above table. p value was 0.776, which shows that there is no role of stress in the causation of STEMI.

Table9: Association of Diet with STEMI.

Type of diet	Type of Myocardial Infarction		Total
	STEMI	Non STEMI	
Fried/Oil rich	17(20.5%)	5(22.7%)	22(21.0%)
Normally cooked	66(79.5%)	17(77.3%)	83(79.0%)
Total	83(100%)	22(100%)	105(100%)

In the above table, total STEMI patients were 83 out of which 17(20.5%) used oil rich diet while 66(79.5%) used normally cooked food. Type of diet is not a risk factor as p value is 0.776.

DISCUSSION:

The present study was undertaken to find out the risk factors associated with STEMI in Cardiology unit of Holy Family Hospital Rawalpindi during the period from December 2017 to July 2018. STEMI continues to be an important health problem in developing as well as in the developed countries with a 3 million people in the year 2015 out of 15.9 million cases of myocardial infarction. There are estimated 500,000 STEMI events per year in the US.

It was a cross-sectional study with 105 patients of myocardial infarction. Results showed that 79% patients had STEMI and 20.9% patients had Non-

STEMI. Age of the patients in terms of mean \pm SD was 60.50 \pm 11.992 years. Frequency of younger patients was higher in Non-STEMI as compared to STEMI. Mean \pm SD of age of STEMI patients were 61.55 \pm 11.513 years which is almost similar to the study carried out by Kirchberger *et al*. Their results were statistically significant (p value<0.001) [11] while our results were statistically insignificant (p value = 0.079). The observed difference was due to the fact that our sample was smaller while their sample was larger.

Family history is a non-modifiable risk factors for the development of STEMI. Frequency of the positive

family history(36.1%) was higher in patients of Non-STEMI than STEMI. While from European registry, 25.6% had positive history and from the study conducted in Karachi, 24.3% patient had positive family history. [15] There is a difference between our results and results by these two studies. The observed difference was due to the fact that our sample size was smaller. In our study, there was no association found between family history and STEMI (p value=0.465). Our finding is similar to a study carried out in Karachi (p value 0.62). [13] Hypertension is the major modifiable risk factor for causing STEMI and causes significant morbidity and mortality. Frequency of hypertension was higher (63.9%) in STEMI patients compared to Non-STEMI patients. Our findings are almost consistent with the findings of the study carried out by Kirchberger *et al*. [12] Our results were statistically insignificant (p value = 1.000) while by Kirchberger *et al*, results were statistically significant (p< 0.001). [12] The difference observed was due to larger sample size of the study carried out by Kirchberger *et al*.

Diabetes is a well-established risk factor in the causation of STEMI. Frequency of diabetes was higher in Non-STEMI as compared to STEMI. Our findings of frequency of diabetes correlate with the findings of the study carried out by Xavier *et al*. [22] These findings almost also coincide with the findings of the study done in Peshawar. [1] Our results were insignificant while the results from the study conducted in Karachi were significant. [15] The difference noted was due to the smaller size of our sample and difference in sampling technique. Another important risk factor for STEMI is smoking.

Frequency of smoking was higher in Non-STEMI patients as compared to STEMI patients. In a study carried out by Kirchberger *et al*, 30.8% never smoked, 42.3% were current smokers and 26.9% were ex-smokers. [13] There is a marked difference between this study and our study. The difference could be due to difference in sample size and different frequencies of males and females in the two studies. Difference could also be contributed by the different setting and different communities. Smoking had no association with STEMI (p value=0.792) as found in our study while study by Kirchberger *et al* showed association of smoking with STEMI (p<0.001).⁷

CONCLUSION:

Mean age of the STEMI patients was higher than that of Non-STEMI patients, although the difference of their means was insignificant. Frequency of STEMI was higher than that of Non-STEMI. Frequency Of different risk factors of STEMI was observed.

Frequency of hypertension and stress was higher in STEMI patients while frequency of diabetes, smoking and obesity was higher in Non-STEMI patients, although these results were not statistically significant. Among STEMI patients, Sedentary lifestyle was most common followed by hypertension and family history. The least frequent risk factor was obesity.

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