Journal of Cardiovascular Disease Research
ISSN: 0975-3583, 0976-2833 VOL13, ISSUE 08, 2022

PAIN PECULIARITIES IN SUBJECTS WITH ISCHEMIC HEART DISEASE ALONG WITH THE METABOLIC SYNDROME

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Conflict of Interest: None
Type of study: Original Research Paper
Date of submission: 12 November 2022
Date of acceptance: 20 November 2022
Date of publication: 30 November 2022

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ABSTRACT

Background: Painful episodes are frequently seen in subjects with impaired glucose tolerance in diabetes mellitus. The duration of these painful episodes is lower in subjects with associated ischemic heart disease compared to subjects without cardiac ischemia.

Aims: To evaluate the peculiarity of painful attack duration in subjects with coronary artery disease and the main elements of metabolic syndrome.

Methods: Subjects with complaints of chest pain and left-hand pain were assessed. For all the study participants, glycemia, triglycerides, cholesterol, Quetelet index for body weight, and blood pressure were assessed.

Results: The study results showed that in subjects with hypertension there is an increase in both electrocardiography ischemic changes and risk of coronary artery disease. Duration of painful attacks based on the bodyweight showed lower duration in subjects with cardiac ischemia compared to subjects without the disease.

Conclusion: The study concludes that there exists a link between the presence of main elements of metabolic syndrome and the duration of the painful attacks in the chest.

Keywords: Abdominal obesity, Coronary heart disease, Diabetes, Hyperlipidemia, Hypertension, Metabolic syndrome, Painful attack

INTRODUCTION

The success of prevention and effective management of coronary artery disease is largely governed by the early disease diagnosis. Recently, various methods are used to detect coronary heart disease (CHD) including coronary angiography, exercise test, pharmacological tests, EchoCG (echocardiography), ECG (electrocardiography), and/or survey method. To diagnose coronary artery disease, the most accessible method widely used

at primary healthcare centers are surveys and ECGs. However, ischemic changes in the myocardium, are not always seen in the ECG done at rest.[1]

In 1968, Rose and Blackburn have proposed an interview method for the diagnosis of ischemic heart disease (IHD) which has the advantages of being a vital, accessible, economical, and simple method at the outpatient level as well as at the community level. However, this method is applicable only in subjects with typical exertion angina which is a painful attack. In clinical practice, cases of painless disease and atypical disease are commonly seen. In such cases of the disease, the reliability of this method is questioned and reduced.[2]

Previous population-based and clinical studies have reported that in subjects with diabetes mellitus, the characteristics of the painful chest attack are governed by diabetes. In cases of painless attacks and asymptomatic cases, these subjects usually have associated diabetes mellitus with coronary heart disease. Recently, an insulin-based entity, metabolic syndrome has been shown to play a vital role in the development of coronary heart disease. Metabolic syndrome presence has been correlated with a high risk of mortality and coronary heart disease.[3]

Obesity, hyperlipidemia, arterial hypertension, and hyperinsulinemia remain the main components of the metabolic syndrome. Painful attack characteristics in subjects with ischemic heart disease are also influenced by the presence of these main components of metabolic syndrome individually. This painful episode occurrence in subjects with coronary artery disease along with the main components of the metabolic syndrome can act as a reliable factor for prevention, early diagnosis, and management of the coronary artery disease.[4] Hence, the present study was done to evaluate the peculiarity of painful attack duration in subjects with coronary artery disease and the main elements of metabolic syndrome.

MATERIALS AND METHODS

The present clinical survey study was done to evaluate the peculiarity of painful attack duration in subjects with coronary artery disease and the main elements of metabolic syndrome. The study was done after the clearance was given by the Ethical committee. The study population was contributed by the subjects visiting the Outpatient Department of the Institute.

The present study included 300 male subjects who visited the Outpatient Department with the chief complaint of pain in their left hand and chest. The inclusion criteria for the study were males with the complaint of pain in the left hand and chest, the subject who were in the mental state of giving consent, and the subjects who were willing to give consent for participation in the study. The exclusion criteria were subjects who were mentally not well and did not give consent to participate in the study.

After explaining the detailed study design, informed consent was taken from all the study subjects. The mean age of the study subjects was 51.5±2.4 years. The diagnosis of ischemic heart disease was not confirmed in 216 study subjects while examination and the remaining 84 subjects had confirmed diagnosis of coronary heart disease. Also, in 60 subjects with

ISSN: 0975-3583, 0976-2833 VOL13, ISSUE 08, 2022

coronary artery disease, ECG at rest showed the ischemic changes, whereas, in 24 subjects, no ischemic changes were seen.

In subjects with no ischemic changes depicted on ECG, coronary artery disease diagnosis was established based solely on the positive exercise test. For all the participants, glycemia (dependent on glucose tolerance test), triglycerides, cholesterol, Quetelet index for body weight, and blood pressure were assessed. The data collected was assessed for results formulation.

RESULTS

The results of the present study showed that the duration of the painful episode is associated with the key components of metabolic syndrome. In subjects with impaired glucose tolerance, the duration of the painful attacks is higher than in subjects with normal glucose tolerance compared to impaired tolerance. However, the difference was statistically non-significant ($p>0.01$) as shown in Table 1. In subjects with IHD and no changes and changes on ECG, the value was significantly lower, 4.55±0.27 and 4.51±0.36 compared to no IHD with 7.06±0.47. In diabetics, in subjects with IHD and no ECG changes, the duration of painful episodes was significantly lower, 2.02±0.49, compared to 8.84±0.45 and 8.02±0.0in subjects with no IHD and IHD with no ECG changes respectively. In subjects with high glucose tolerance, in subjects with no ECG change the duration was significantly lower (Table 1).

Concerning the correlation between the presence of hypertension and the duration of the painful attack, it was seen that painful attack duration was lower in subjects with CHD compared to subjects without CHD. Also, in subjects having hypertension, painful attack duration was lower compared to subjects with normal blood pressure, except in subjects with coronary artery disease and ischemic changes on ECG where longer pain duration was seen in subjects with increased blood pressure (Table 2). In subjects with normal blood pressure, the duration was significantly lower in subjects with IHD and no ECG changes and IHD with ECG changes where values were 4.92±0.22 and 3.35±0.27 compared to no IHD subjects where the value was 7.77±0.46. In subjects with arterial hypertension, the value was significantly lower, 5.45±0.39, in subjects with IHD and ECG changes compared to other values (Table 2).

One of the main components of metabolic syndrome is dyslipidemia, lipid metabolism disorder presence has a high risk of coronary artery disease development. On assessing the duration of painful attacks based on the hypercholesterinaemia, the subjects with normal cholesterol level's duration of the painful attack were significantly higher compared to subjects with hypercholesterinaemia whereas in subjects having IHD with no ECG changes, the mean duration was 4.84±0.26 in normal cholesterol group compared to 4.42±0.24 in subjects with hypercholesterinaemia (Table 3).

DISCUSSION

The present study results showed that the duration of the painful episode is associated with the key components of metabolic syndrome. In subjects with impaired glucose tolerance, the duration of the painful attacks is higher than in subjects with normal glucose tolerance compared to impaired tolerance. However, the difference was statistically non-significant ($p>0.01$) as shown in Table 1. In subjects with IHD and no changes and changes on ECG, the

value was significantly lower, 4.55±0.27 and 4.51±0.36 compared to no IHD with 7.06±0.47. In diabetics, in subjects with IHD and no ECG changes, the duration of painful episodes was significantly lower, 2.02±0.49, compared to 8.84±0.45 and 8.02±0.0in subjects with no IHD and IHD with no ECG changes respectively. In subjects with high glucose tolerance, in subjects with no ECG change the duration was significantly lower. These results were consistent with the studies of Laughlin GA et al[5] in 2007 and Blomkalns Al et al[6] in 2003 where impaired glucose tolerance and duration of painful attacks had shown a similar correlation by the authors as in the present study.

For the correlation between the presence of hypertension and the duration of the painful attack, it was seen that painful attack duration was lower in subjects with CHD compared to subjects without CHD. Also, in subjects having hypertension, painful attack duration was lower compared to subjects with normal blood pressure, except in subjects with coronary artery disease and ischemic changes on ECG where longer pain duration was seen in subjects with increased blood pressure. In subjects with normal blood pressure, the duration was significantly lower in subjects with IHD and no ECG changes and IHD with ECG changes where values were 4.92±0.22 and 3.35±0.27 compared to no IHD subjects where the value was 7.77±0.46. In subjects with arterial hypertension, the value was significantly lower, 5.45±0.39, in subjects with IHD and ECG changes compared to other values. These findings were in agreement with the results of Tonstad S et al[7] in 2003 and Chen W et al[8] in 2007 where authors reported a lower duration of the pain attacks in subjects with normal blood pressure compared to hypertensives as depicted by the results of the present study.

Dyslipidemia is one of the most common components of metabolic syndrome, metabolism disorder presence has a high risk of coronary artery disease development. On assessing the duration of painful attacks based on the hypercholesterinaemia, the subjects with normal cholesterol levels' duration of the painful attack were significantly higher compared to subjects with hypercholesterinaemia whereas in subjects having IHD with no ECG changes, the mean duration was 4.84±0.26 in normal cholesterol group compared to 4.42±0.24 in subjects with hypercholesterinaemia. These results were comparable to the studies of Clouse RE et al[9] in 2003 and Bhargava A et al[10] in 2003 where levels duration of the painful attack was significantly higher in subjects with hypercholesterinaemia compared to subjects with normal cholesterol levels.

CONCLUSION

The study concludes that there exists a link between the presence of main elements of metabolic syndrome and the duration of the painful attacks in the chest. However, the present study had a few limitations including small sample size, short monitoring time, and geographical area biases. Hence, more longitudinal studies with larger sample size and longer monitoring period will help reach a definitive conclusion.

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TABLES

CHD and Diabetes	Indicator	No IHD	IHD with no ECG changes	IHD with ECG changes	General
Normal tolerance	Number (n)	130	14	30	174
	Mean ± S. D	7.06±0.47	4.55±0.27	4.51±0.36	6.42±0.46
Diabetes	Number (n)	14	2	4	20
	Mean ± S. D	8.84±0.45	8.02±0.0	2.02±0.49	7.42±0.43
High tolerance	Number (n)	72	8	26	106
	Mean ± S. D	7.76±0.52	4.02±0.13	4.64±0.35	6.74±0.46

Table 1: Painful attack duration in subjects with different glucose tolerance

CHD and hypertension	Indicator	No IHD	IHD with no ECG changes	IHD with ECG changes	General
Normal	Number (n)	152	20	30	202
	Mean ± S. D	7.77±0.46	4.92±0.22	3.35±0.27	6.83±0.45
Arterial hypertension	Number (n)	64	4	30	98
	Mean ± S. D	6.64±0.46	3.52±0.17	5.45±0.39	6.18±0.44

Table 2: Painful attack duration in subjects with different blood pressure levels

CHD and hypertension	Indicator	No IHD	IHD with no ECG changes	IHD with ECG changes	General
Normal	Number (n)	116	14	34	164
	Mean ± S. D	7.82±0.51	**4.84±0.26**	**5.27±0.42**	7.04±0.49
Hypercholesterinaemia	Number (n)	100	10	26	136
	Mean ± S. D	6.96±0.47	4.42±0.24	**3.25±0.21**	6.06±0.41

Table 3: Painful attack duration in subjects with Hypercholesterinemia