**Results**

**Table (1): Sociodemographic characteristics of the studied groups**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Item** | **Heart rate** | | | | | | | **P-value** |
| **HR<60 BPM**  **Group I**  **(N=21)** | | **HR 60-100**  **Group II**  **(N=21)** | | **HR>100**  **Group III**  **(N=21)** | | |
| **No.** | **%** | **No.** | **%** | **No.** | | **%** |
| **Age (years)** | | | | | | | | |
| Mean ± SD | 62.14 ± 8.42 | | 59.9 ± 9.57 | | 58.8±9.7 | | | # 0.543  (NS) |
| Median (Range) | 64 (36 – 75) | | 64 (41 – 76) | | 62(36-76) | | |
| **Sex** | | | | | | | | |
| Male | 18 | 85.7 | 19 | 90.5 | 18 | 85.7 | | ***‡*** 0.867  (NS) |
| Female | 3 | 14.3 | 2 | 9.5 | 3 | 14.3 | |

***# Kruskal Wallis test***

***‡Chi-square test***

***\* P < 0.05 is significant.***

This table shows that age of the studied group 1 with heart rate less than 60 Bpm ranging from 36-75 years old with mean 62.14 ± 8.42 years old and most of them are male (85.7%),and age of the studied group with heart rate HR 60-100 group ranging from 41-76 years old with mean 59.9 ± 9.57 years old and 90.5% of them are male, while in the patients group with HR>100 Bpm their age ranging from 36-76 years old with mean 58.8±9.7 years old, with no statistical difference between all groups regarding age and sex distribution ,figure (1).

**Figure (1):** **Bar chart for comparison of age among the studied groups**

**Table (2): Co-morbid diseases among the studied groups.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Item** | **HR<60 BPM**  **Group I**  **(N=21)** | | **HR 60-100**  **Group II**  **(N=21)** | | **HR>100**  **Group III**  **(N=21)** | | **P-value of**  **χ2** |
| **No.** | **%** | **No.** | **%** | **No.** | **%** |
| Diabetes Mellitus | 7 | 33.3 | 12 | 57.1 | 15 | 71.4 | 0.044\* |
| Hypertension | 7 | 33.3 | 11 | 52.4 | 16 | 76.1 | 0.020\* |
| Dyslipidemia | 2 | 9.5 | 2 | 9.5 | 10 | 47.6 | 0.002\* |

***#* χ2: *Chi-square test***

***\* P < 0.05 is significant.***

The previous table shows distribution of comorbid diseases among the studied groups, Diabetes mellitus is statistically higher in patients with HR >100 Bpm and HR 60-100 Bpm versus patients with HR < 60 Bpm (71.4% and 57.1% Vs 33.3%) respectively, also there is significant difference between groups regarding presence of hypertension or dyslipidemia.

**Figure (2):** **Distribution of comorbidities among the studied groups**

*This graph shows* distribution of co-morbidities among the studied groups. DM, hypertension, dyslipidemia is found in (33.33%, 33.3% &9.5%) respectively in HR< 60 Bpm patients versus (71%, 76% & 48%) respectively in patients with HR>100 bpm.

**Table (3): Smoking among the study groups**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Item** | **HR<60 BPM**  **Group I**  **(N=21)** | | **HR 60-100**  **Group II**  **(N=21)** | | **HR>100**  **Group III**  **(N=21)** | | | **P-value** |
| **No.** | **%** | **No.** | **%** | **No.** | **%** | |
| **Smoking** | | | | | | | | |
| * Not smoker | 4 | 19.0 | 9 | 42.8 | 1 | | 4.7 | 0.011\*  (S) |
| * Smoker | 17 | 81.0 | 12 | 54.2 | 20 | | 95.3 |

***#* χ2: *Chi-square test***

***\* P < 0.05 is significant.***

This table shows that 1/5 of group I (19.0%) are not smokers and 81% are smokers, there is statistically significant difference between the 3 groups regarding smoking.

**Table (4):** **Blood pressure in relation to heart rate among the study groups**

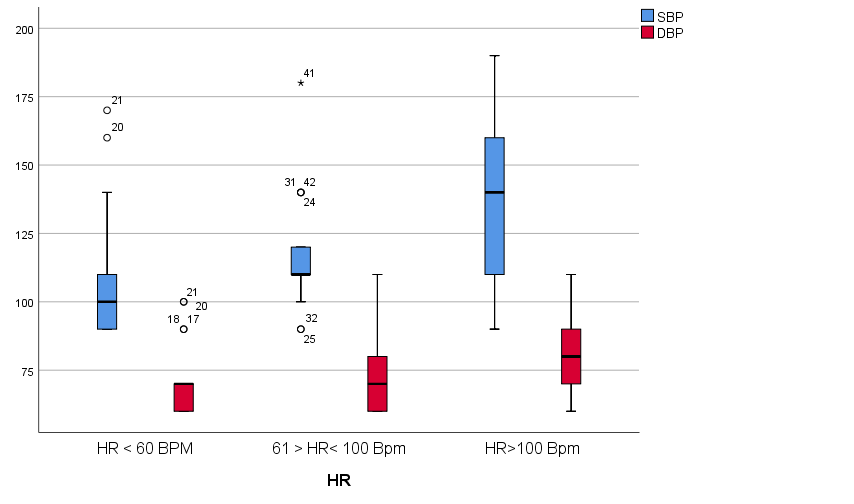
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Blood pressure** | **HR<60 BPM**  **Group I**  **(N=21)** | **HR 60-100**  **Group II**  **(N=21)** | **HR>100**  **Group III**  **(N=21)** | **P-value** |
| **Systolic BP** |  |  |  |  |
| Mean ± SD | 107.6±24.06 | 117.4±20.28 | 137.6±30.8 | 0.001\*  (S) |
| Median (Range) | 100(90-170) | 110(90-180) | 140(90-190) |
| **Diastolic BP** |  |  |  |  |
| Mean ± SD | 70.48±13.22 | 73.3±12.78 | 82.3±15.4 | 0.020\*  (S) |
| Median (Range) | 70(60-100) | 70(60-110) | 80(60-110) |

***Kruskal Wallis test***

***\* P < 0.05 is significant.***

This table shows that there is high significant difference in heart rate in relation to systolic and diastolic blood pressure where systolic and diastolic blood pressure is higher in patients with HR > 100 bpm, figure (3).

**Figure (3): Box plot representing blood pressure in relation to HR**

******

**Table (5):** **ECG findings among the study groups**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **ECG** | **HR<60 BPM**  **Group I**  **(N=21)** | | **HR 60-100**  **Group II**  **(N=21)** | | **HR>100**  **Group III**  **(N=21)** | | **P-value** |
| **No.** | **%** | **No.** | **%** | **No.** | **%** |
| * Anterior | 9 | 42.9 | 15 | 71.4 | 21 | 100.0 | 0.000\* |
| * Inferior | 12 | 57.1 | 7 | 33.3 | 2 | 9.5 | 0.005\* |
| * Lateral | 3 | 14.3 | 5 | 23.8 | 10 | 47.6 | 0.048\* |
| * Posterior | 1 | 4.8 | 3 | 14.3 | 0 | 0.0 | 0.154 |

***#* χ2: *Chi-square test***

***\* P < 0.05 is significant.***

This table shows that there is high statistically significant difference between the 3 groups regarding presence of ECG changes in Anterior , inferior and lateral ECG .

**Figure (4):** **ECG findings among the study groups :**

*This graph shows* distribution of ECG findings among the studied groups. Positive anterior ECG finding was found in 43% in patients with HR< 60bpm and in 71% of patient with HR ranging from HR 60-100 bpm vs 100% of patients with HR above 100 bpm.

**Table (6):** **ECHO finding in relation to heart rate among the study groups**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Item** | **HR<60 BPM**  **Group I**  **(N=21)** | **HR 60-100**  **Group II**  **(N=21)** | **HR>100**  **Group III**  **(N=21)** | **P-value** |
| **EF%** | | | | |
| Mean ± SD | 56.25±6.6 | 56.95±7.07 | 52.29±10.4 | 0.477  (NS) |
| Median (Range) | 55(40-72) | 56(37-72) | 54(30-66) |
| **LVEDV** | | | |  |
| Mean ± SD | 58.29±10.27 | 57.62±19.19 | 63.14±24.06 | 0.377  (NS) |
| Median (Range) | 53(41-73) | 52(41-133) | 55(50-133) |
| **LVESV** | | | | |
| Mean ± SD | 39.05±8.54 | 37.24±9.15 | 40.52±9.8 | 0.634  (NS) |
| Median (Range) | 36(24-51) | 36(24-63) | 36(31-63) |

***Kruskal Wallis test***

***\* P < 0.05 is significant.***

This table shows that there is no statistical difference between ECHO finding in relation to heart rate among the study groups.

**Table (7): Positive Laboratory findings among the studied groups.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Item** | **HR<60 BPM**  **Group I**  **(N=21)** | | **HR 60-100**  **Group II**  **(N=21)** | | **HR>100**  **Group III**  **(N=21)** | | **P-value of**  **χ2** |
| **No.** | **%** | **No.** | **%** | **No.** | **%** |
| Troponin | 21 | 100.0 | 21 | 100.0 | 21 | 100.0 | ---- |
| CKMB | 11 | 52.3 | 20 | 95.2 | 17 | 81.0 | 0.004\* |
| Creatinine | 2 | 9.5 | 3 | 14.3 | 4 | 19.0 | 0.678 |

***#* χ2: *Chi-square test***

***\* P < 0.05 is significant.***

The previous table shows that troponin was positive in 100% of patients among the 3 different groups, there is significant difference between groups regarding positive CKMB laboratory findings.

**Table (8): Primary Percutaneous Coronary Intervention site among the study groups**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **primary PCI** | **HR<60 BPM**  **Group I**  **(N=21)** | | **HR 60-100**  **Group II**  **(N=21)** | | **HR>100**  **Group III**  **(N=21)** | | **P-value** |
| **No.** | **%** | **No.** | **%** | **No.** | **%** |
| * LAD | 10 | 47.6 | 14 | 66.7 | 19 | 90.5 | 0.011\* |
| * RCA | 8 | 38.1 | 10 | 47.6 | 6 | 28.6 | 0.446 |
| * LCX | 5 | 23.8 | 10 | 47.6 | 6 | 28.6 | 0.223 |

***#* χ2: *Chi-square test***

***\* P < 0.05 is significant.***

This table shows that there is high statistically significant difference between the 3 groups regarding PCI in LAD artery, with no significant difference regarding RCA and LCX .

**Table (9): Numbers of blood vessels in relation to heart rate among the study groups**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of Blood vessels** | **HR<60 BPM**  **Group I**  **(N=21)** | | **HR 60-100**  **Group II**  **(N=21)** | | **HR>100**  **Group III**  **(N=21)** | | **P-value** |
| **No.** | **%** | **No.** | **%** | **No.** | **%** |
| * One vessel | 9 | 42.9 | 9 | 42.9 | 13 | 61.9 | 0.005\* |
| * Two vessels | 2 | 9.5 | 11 | 52.4 | 6 | 28.6 | 0.010\* |
| * Three vessels | 10 | 47.6 | 1 | 4.8 | 2 | 9.5 | 0.008\* |

***#* χ2: *Chi-square test***

***\* P < 0.05 is significant.***

This table shows that there is high statistically significant difference between the 3 groups regarding numbers of blood vessels affected in relation to Heart rate.

**Table (10): Complication of PCI in relation to heart rate among the study groups**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **complications** | **HR<60 BPM**  **Group I**  **(N=21)** | | **HR 60-100**  **Group II**  **(N=21)** | | **HR>100**  **Group III**  **(N=21)** | | **P-value** |
| **No.** | **%** | **No.** | **%** | **No.** | **%** |
| * No complications | 15 | 71.4 | 16 | 76.2 | 4 | 19.0 | 0.0001\* |
| * HF with LV dysfunction | 1 | 4.8 | 1 | 4.8 | 5 | 23.8 | 0.076 |
| * Sustained VT | 1 | 4.8 | 2 | 9.5 | 2 | 9.5 | 0.804 |
| * Non sustained VT | 1 | 4.8 | 0 | 0.0 | 1 | 4.8 | 0.596 |
| * Papillary muscle rupture, MR | 1 | 4.8 | 1 | 4.8 | 3 | 14.3 | 0.419 |
| * Cardiogenic shock | 2 | 9.5 | 1 | 4.8 | 5 | 23.8 | 0.155 |
| * A.Fibrillation | 0 | 0.0 | 0 | 0.0 | 1 | 4.8 | 0.362 |

***#* χ2: *Chi-square test***

***\* P < 0.05 is significant.***

This table shows that complications is statistically more common in patients with HR >100bpm than patients with HR < 100 , these complications are in the form of HF with LV dysfunction in 23.8% , Sustained VT in 9.5% , Non sustained VT in 4.8% , Papillary muscle rupture, MR in 14.3% , Cardiogenic shock in 23.8% and atrial Fibrillation in 4.8% of patients with HR >100 Bpm.

**Table (11): correlation between heart rate, systolic and diastolic blood pressure and ECHO ejection fraction among group with heart rate< 60 BPM**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Correlation coefficient** | | **Age** | **HR** | **SBP** | **DBP** | **ECHOEF** | **LVEDV** |
| HR | r | .294 |  |  |  |  |  |
| p-value | .196 |  |  |  |  |  |
| SBP | r | -.237 | -.096 |  |  |  |  |
| p-value | .301 | .680 |  |  |  |  |
| DBP | r | -.251 | -.161 | .940\*\* |  |  |  |
| p-value | .272 | .485 | .000 |  |  |  |
| ECHOEF | r | -.377 | -.136 | .521\* | .409 |  |  |
| p-value | .092 | .557 | .015 | .066 |  |  |
| LVEDV | r | .504\* | .297 | -.687\*\* | -.558\*\* | -.796\*\* |  |
| p-value | .020 | .190 | .001 | .009 | .000 |  |
| LVESV | r | .463\* | .271 | -.595\*\* | -.437\* | -.843\*\* | .957\*\* |
| p-value | .035 | .234 | .004 | .048 | .000 | .000 |

\*correlation is significant at the level of 0.05

\*\*correlation is significant at the level of 0.01

This table shows that there is significant positive correlation between Age and LVEDV and LVESV (r=0.504 & 0.463 )respectively, also there is significant positive correlation between systolic blood pressure and diastolic blood presure and with ejection fraction (r=0.940 & 0.521 )respectively , but there is significant negative correlation between SBP and LVEDV and LVESV also there is significant negative correlation between DBP and LVEDV and LVESV also there is significant negative correlation between Ejection fraction and LVEDV and LVESV (r=-0.796 , p=0.000\*), (r=-0.843, p=0.000\*).

**Table (12): correlation between heart rate, systolic and diastolic blood pressure and ECHO ejection fraction among group with heart rate 60-100 BPM**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Correlation coefficient** | | **Age** | **HR** | **SBP** | **DBP** | **ECHOEF** | **LVEDV** |
| HR | r | .097 |  |  |  |  |  |
| p-value | .675 |  |  |  |  |  |
| SBP | r | -.140 | .424 |  |  |  |  |
| p-value | .545 | .056 |  |  |  |  |
| DBP | r | -.051 | .370 | .928\*\* |  |  |  |
| p-value | .826 | .098 | .000 |  |  |  |
| ECHOEF | r | -.244 | -.414 | -.362 | -.327 |  |  |
| p-value | .287 | .062 | .107 | .148 |  |  |
| LVEDV | r | -.297 | .018 | .250 | .164 | -.405 |  |
| p-value | .191 | .938 | .274 | .477 | .069 |  |
| LVESV | r | -.397 | -.154 | .227 | .127 | -.338 | .903 |
| p-value | .075 | .506 | .322 | .584 | .134 | .000\*\* |

\*correlation is significant at the level of 0.05

\*\*correlation is significant at the level of 0.01

This table shows that there is significant positive correlation between systolic blood pressure and diastolic blood pressure (r=0.928 & p=0.000 ) also there is significant positive correlation between LVEDV and LVESV (r= 0.903 , p=0.000).

**Table (13): correlation between heart rate, systolic and diastolic blood pressure and ECHO ejection fraction among group with heart rate >100 BPM**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Correlation coefficient** | | **Age** | **HR** | **SBP** | **DBP** | **ECHOEF** | **LVEDV** |
| HR | r | .489\* |  |  |  |  |  |
| p-value | .024 |  |  |  |  |  |
| SBP | r | .211 | -.006 |  |  |  |  |
| p-value | .358 | .978 |  |  |  |  |
| DBP | r | .249 | -.103 | .891\*\* |  |  |  |
| p-value | .277 | .655 | .000 |  |  |  |
| ECHOEF | r | -.133 | .012 | .297 | .385 |  |  |
| p-value | .564 | .957 | .191 | .084 |  |  |
| LVEDV | r | .117 | .119 | -.544\* | -.520\* | -.502\* |  |
| p-value | .612 | .608 | .011 | .016 | .020 |  |
| LVESV | r | .126 | .080 | -.429 | -.427 | -.562\*\* | .975\*\* |
| p-value | .585 | .729 | .052 | .054 | .008 | .000 |

\*correlation is significant at the level of 0.05

\*\*correlation is significant at the level of 0.01

This table shows that there is significant positive correlation between Age and Heart rate above 100 bpm (r=0.489), also there is significant positive correlation between systolic blood pressure and diastolic blood pressure (r=0.891 ) , but there is significant negative correlation between SBP and LVEDV also there is significant negative correlation between DBP and LVEDV also there is significant negative correlation between Ejection fraction and LVEDV and LVESV (r=-0.502 , p=0.020\*), (r=-0.562, p=0.008\*) also among group with HR above 100 bpm there is significant positive correlation between LVEDV and LVESV (r=0.975 ).

**Table (14): logistic regression of HR above 100 Bpm depending on presence of risk factors among the studied groups.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Risk factors** | **B** *coefficient* | **S.E.** | **P-value** | **Exp(B)** |
|
| Age | 21.167 | 1050.1 | .984 | 1558238943.907 |
| Sex | -262.312 | 14146.9 | .985 | .000 |
| DM | 361.025 | 17892.381 | .984 | 6.180E+156 |
| HTN | 147.823 | 8697.023 | .986 | 1.580E+64 |
| Dyslipidemia | 24.970 | 6391.788 | .997 | 69847081314.991 |
| Smoking | -319.615 | 16224.981 | .984 | .000 |
| SBP | 16.502 | 836.763 | .984 | 14680261.442 |
| DBP | -32.220 | 1632.311 | .984 | .000 |
| ECHOEF | 2.754 | 234.352 | .991 | 15.701 |
| LVEDV | -8.609 | 872.608 | .992 | .000 |
| LVESV | 21.777 | 1258.611 | .986 | 2868834461.136 |
| PCI LAD | 497.216 | 3159504.50 | 1.000 | 8.673E+215 |
| RCA | -218.153 | 46360.099 | .996 | .000 |
| LCX | 160.277 | 41486.209 | .997 | 4.051E+69 |
| Disease vessel1 | 160.776 | 41516.624 | .997 | 6.672E+69 |
| Constant | -776.482 | 86804.209 | .993 | .000 |

*R2= 0.78*

*Chi-square test for model coefficient =52.78, P-value=0.005\**

*Variable(s) entered on equation:* *HTN, DM, dyslipidemia, Smoking, sex, age, ECHOEF, LVEDV, LVESV, Pri PCI LAD, RCA, LCX, Diseased vessel.*

*\*Statistical significance*

***The table*** represents the best fitting logistic regression model for Hr above 100 Bpm, , A logistic regression was performed to ascertain the effects of HTN, DM, obesity, Smoking, male gender, age on the likelihood that participants have tachycardia. The logistic regression model was statistically significant, χ2= 52.78, p < .0005. The model explained 78 % (Nagelkerke R2) of the variance in heart rate above 100.