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STEMI time presentation, are circadian patterns and week hours related to the outcome?

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Background: Previous studies have suggested that patients treated during night hours had significantly longer delay times than those treated during day hours without difference in terms of in-hospital mortality. A circadian pattern can also be seen in STEMI presentation but data analyzing a relationship between this circadian pattern and prognosis are missing.
Objective: We aimed to evaluate clinical outcomes of STEMI patients according to the time of medical attention (on-hour vs off-hour) and to the circadian pattern.
Methods: Observational, multicenter study, based on prospectively collected data from consecutive patients treated within the STEMI Network during the period between January 2010 and December 2015. On-hour presentation included patients treated between 8:00h and 19:59h on weekdays, the rest were catalogued as off-hour presentation. In the circadian pattern analysis, event frequencies were analyzed by time of onset in keeping with a circular distribution over the 24-hour clock. The Rayleigh test was used to evaluate the hypothesis of a uniform distribution of times. The primary endpoint was 1-year all-cause mortality. Secondary endpoints were 30-day all-cause mortality and in-hospital complications.
Results: A total of 8608 patients were included, 3795 (44.1%) in on-hour group and 4813 (55.9%) in off-hour group. There were significant differences with a shorter patient delay (157±227min vs. 141±193min; $p<0.01$) and longer system delay (132±86 min vs. 152±111min; $p<0.01$) in the on-hour vs. off-hour group. However, there was no difference in total ischemic time (287±256 min vs. 293±242 min; p=0.265). At 30-day and 1-year follow-up there were no differences in adjusted all-cause mortality between groups [OR 0.91 (CI95%: 0.73–1.12; p=0.35) and OR 0.99 (CI95%: 0.83–1.17; p=0.87), respectively]. In-hospital atrioventricular block was more frequent in on-hour group as compared to off-hour (4.2% vs 3.3%; p=0.02).
A circadian pattern was observed between 9:00 am and 12:30 pm, patients presenting a circadian pattern showed a shorter patient delay (135.29±186.83min vs. 152.44±215.11min; $p<0.01$), system delay (134.93±89.36min vs. 145.63±104.93min; $p<0.01$) and total ischemic time (270.78±255.55min vs. 270.34±227.34min; $p<0.01$) with no differences in 30-day and 1-year mortality between patients with or without the pattern [OR 1.02 (IC95%: 0.81–1.30; p=0.85) and OR 1.12 (IC95%: 0.92 - 1.36; p=0.25) respectively]. This circadian pattern was repeated each day weekly during the period of the study.
Conclusions: Off-hour STEMI presentation was associated with a shorter patient delay and longer system delay without an increase in total ischemic time. The off-hour presentation was not related to an increase in 1-year all-cause mortality when compared to on-hour. A circadian pattern was found, patients included in this group presented a shorter total ischemic time without differences in 30-day and 1-year mortality.