

# Effect of Environmental Conditions and Lunar Phase on the Incidence of Ischemic Heart Disease

ISSN: 2688-836X



**\*Corresponding author:** Juan E Puche, Cardiology Department, University Hospital "Puerta del Mar", Cádiz, Spain

**Submission:**  July 01, 2022

**Published:**  July 18, 2022

Volume 11 - Issue 3

**How to cite this article:** Juan E Puche, Marta Iturregui-Guevara. Effect of Environmental Conditions and Lunar Phase on the Incidence of Ischemic Heart Disease. *Nov Res Sci.* 11(3). NRS. 000763. 2022.

DOI: [10.31031/NRS.2022.11.000763](https://doi.org/10.31031/NRS.2022.11.000763)

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**Juan E Puche<sup>1\*</sup> and Marta Iturregui-Guevara<sup>2</sup>**

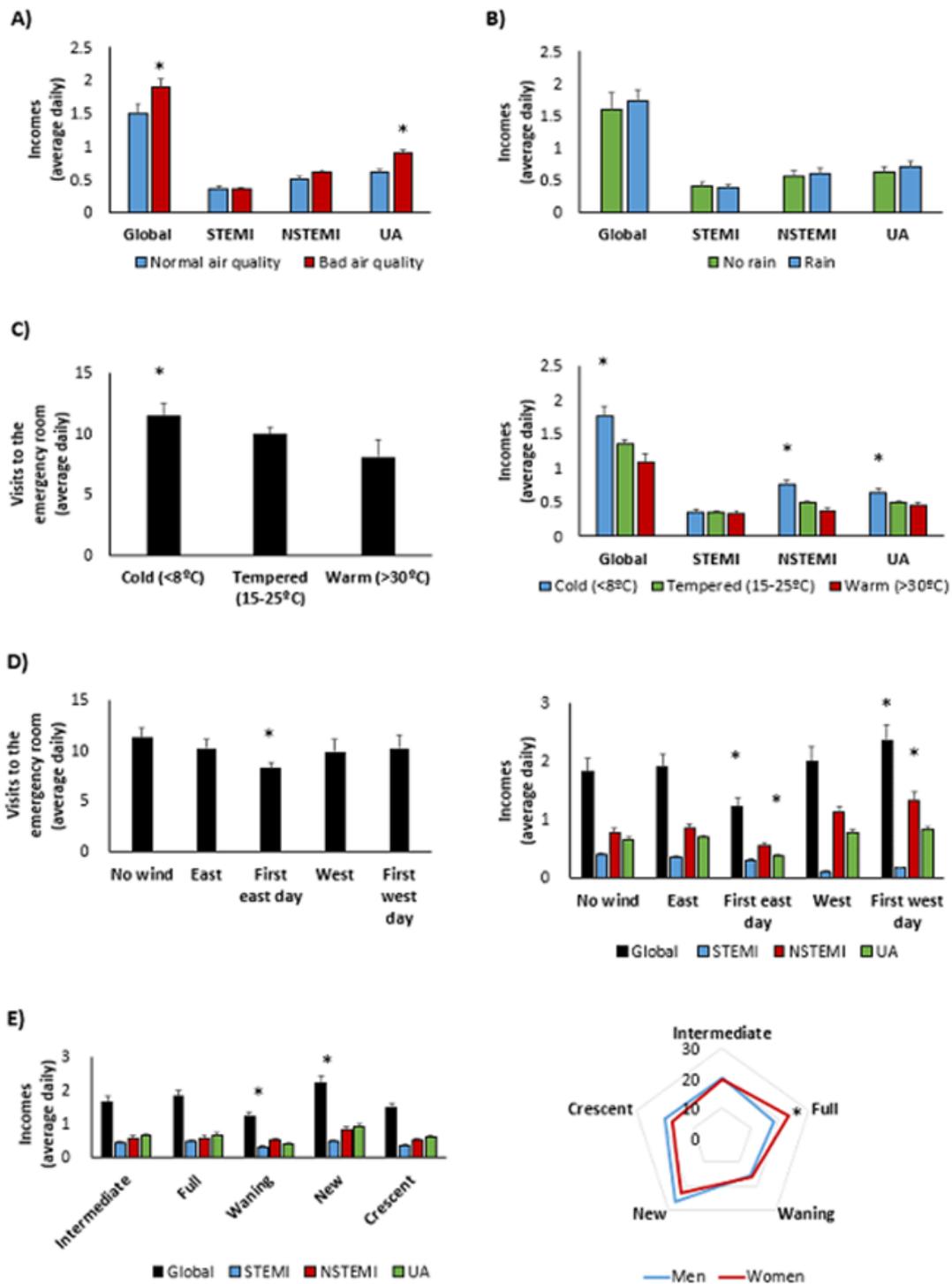
<sup>1</sup>Cardiology Department, University Hospital Puerta del Mar, Spain

<sup>2</sup>Endocrinology Department, University Hospital from Jerez, Spain

## Mini Review

In the last decade, an important body of knowledge has been built up around the significant role that the environmental exposure has on the development and severity of Cardiovascular Diseases (CVD) [1-3]. In addition to the genetic predisposition, both heart and vascular system are considerably vulnerable to a number of environmental agents: air pollution, temperature, noise exposure, etc., [1-3]. Like traditional risk factors, such as smoking and diabetes mellitus, these exposures advance disease and mortality via augmentation or initiation of pathophysiological processes associated with CVD, including blood-pressure control, carbohydrate and lipid metabolism, vascular function, and atherogenesis [1-3]. In another hand, the impact of lunar phases and its gravitation on the occurrence of myocardial infarction has been studied as well, but with unclear results. Although some registries denies such an effect [4,5], others (more discrete) defend this relationship [6-8]. Under this perspective, we designed a protocol to elucidate the role of some environmental conditions on the incidence of ischemic heart disease in the urban population of Cádiz (Spain). During the years 2018 and 2019, 7,256 consecutive patients were included in the study after being attended in our Hospital's Emergency Room for chest pain (or similar). Among those 1,210 were admitted with one of the following diagnoses: ST-Segment Elevation Myocardial Infarction (STEMI), Non ST-Segment Elevation Myocardial Infarction (NSTEMI), or Unstable Angina (UA). In addition, official data from some environmental conditions (as air pollution, rainfall, temperatures, winds and lunar phases) were collected with the idea of finding potential correlations that may serve as hypothesis generator for future studies.

After the adequate statistical processing, we found some interesting results. The days with high air pollution (PMs, O<sub>3</sub>, CO, NO<sub>2</sub> and SO<sub>2</sub>) there was a 26.7% increment in the number of incomes for Acute Coronary Syndromes (ACS) at the expense of unstable anginas (Figure 1A, p<0.05). No differences were found when comparing rainy vs. not-rainy days (Figure 1B). Regarding the effect of the atmospheric temperature, we observed both an increase in the number of visits to emergency room and incomes for non ST-segment elevation ACS the cold days (<8°C) (Figure 1C, p<0.05). When we analyzed the effect of the wind, there was a 26.8% reduction of visits to emergency room the first day of (warm) east wind (the so-called "levante") as compared to windless days (Figure 1D, left panel, p<0.05). Consequently, this translated in a depletion in the number of hospitalizations those days; furthermore, there was a 27.8% increase in the number of incomes the first day of (cold) west wind (the so-called "poniente"), despite the normal influx to emergency room on those days.



**Figure 1:** Impact of different environmental conditions and lunar phases on the incidence of acute coronary syndromes. A) Air pollution B) Rainfall C) Temperature D) Wind E) Lunar phase \*p<0.05 vs. each control. NSTEMI: Non St-Segment Elevation Myocardial Infarction; STEMI: ST-Segment Elevation Myocardial Infarction; UA: Unstable Angina.

Finally, when we correlated the lunar phases with the incidence of ACS we found a significant difference between waning and new moons, with a 83.3% increase in the second one (Figure 1E, left panel, p<0.05). Interestingly, there was a sex-dependent difference

the days of full moon, with a higher number of incomes (31.5% more) among women compared to men (Figure 1E, right panel, p<0.05). In the light of these results, and as it was previously stated, more studies are needed to confirm and explain the potential

effect of these environmental conditions on the incidence of ACS. Moreover, when some of those may be difficult to modify (rain, wind, temperatures, moon phase), but others as the air pollution are consequence of our industrialized lifestyle. For this reason, the scientific community should grant the status of an important cardiovascular risk factor to air pollution, in order to support the implementation of policies to protect public health.

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