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Allowed for defend by
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Deparment of the Meteorology,
Climatology and Atmosphere
Environment

BACHELOR GRADUATION WORK

Weather variations and its influence on a human health

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FOREWORD

Climate and weather influence human health and well-being in many different ways. The climate is in itself a resource which provides for the necessities for life. Throughout the ages, human beings have adapted to this resource by arranging shelter, food production, energy provision and lifestyles in harmony with climate and environmental conditions in general.[1]

Biometeorology is an interdisciplinary science studying the interactions between atmospheric processes and living organisms - plants, animals and humans. It concerns the process-response system of energy and matter flows within the biosphere.

The International Society of Biometeorology (ISB) was founded on August 29, 1956, at the UNESCO headquarters in Paris, France. The foundation was initiated by the geologist Dr S.W. Tromp (The Netherlands) and the meteorologist Dr H. Ungeheuer (Germany) and several human physiologists of which Dr F. Sargent II (USA) became the first President.

The motivation of the foundation of ISB was to bring together scientists working in the field of Biometeorology, who are interested in environmental and ecological problems. At that time the general interest in these issues was developing all over the world and the scientists in these fields were rather isolated.

The purpose of ISB today is to provide one international organization for the promotion of interdisciplinary collaboration of meteorologists, physicians, physicists, biologists, climatologists, ecologists and other scientists and to promote the development of Biometeorology. ISB is based on individual membership. Membership is open to all persons with academic training and degree.[2]

Biometeorology has long been focused on variations of atmospheric parameters and their influence on human health. In particular, the theory and

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methodology to assess the influence of temperature extremes on mortality has been thoroughly developed.

At present, one of the main areas of biometeorological research is focused on heliophysical factors affecting human body. The Objective of Work is to study the impact of solar radio-bursts on some clinical indicators of human health

INTRODUCTION

Health has been defined by the World Health Organization as "...a state of complete physical, mental and social well-being and not merely the mere absence of disease or infirmity". Without doubt, certain aspects of this well-being are sensitive to both weather and climate. For example, cardiovascular disease is more likely to occur in people exposed to severe weather stress from extreme heat (Figure 1) and/or extreme cold. In addition, in many areas of the tropics, a large number of persons are still subject to diseases which relate closely to the influence of their hot, humid climates. In other areas, respiratory illnesses aggravated by cold, damp weather or by pollution occur widely in spite of the considerable ability of modern societies to insulate themselves from the harsher effects of the climate.

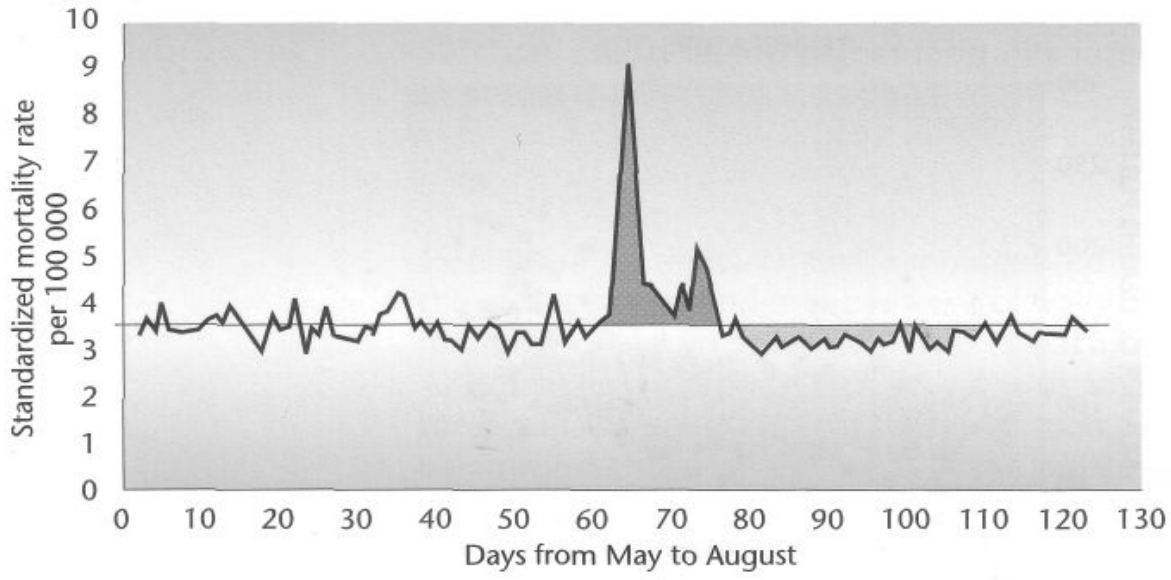

Figure 1 - Daily summer mortality during a heat wave in New York,USA in 1966.[3]

Furthermore, quite apart from actual sickness and disease which can be directly related to weather, our needs and productivity are also linked in subtle ways to the

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climate, with some people much more sensitive to these factors than others.

Physiological and behavioural differences between cultures have developed over many millennia as a consequence of exposure to vastly different climatic regimes. Thus, the dark skin of some ethnic groups gives extra protection against the ravages of excessive ultraviolet radiation, while Eskimos through adaptation and their way of life, especially choice of clothing and diet, can withstand intense cold. Indeed, it is remarkable how people are able to adapt themselves to both heat and cold, providing extremes of temperatures and other factors do not occur for lengthy periods.

The opportunities for indulging in numerous outdoor sports and recreational activities and the potential for enjoying them are also related to the climate. Human health and well-being are in many cases enhanced by participating in such activities.

The links between climate and human health are therefore many and varied.

Results

Some interrelation have been found between variations of SRB type III and cardio-death's days:

1.The number of SRB type III in "bad" days (both – death- and hospitalisation) is significantly less than in "quite" days. The significance level of difference by Kruskal-Wallis test: p=0.0035 for the death's days and p=0.0305 for the days of hospitalisation (see Appendix, Figure 3, 4). It means, that we can say about the distinction of mean srb quantity in calm days and in hospitalisation days, with 97 - 99 % probobility.

2. The investigation of the history of radiobursts situation before and after the day of death-registration shows the significant fall of daily number of radiobursts two days before both death- days and hospitalisation (see Appendix, Figure 5). The significance level of difference between (-1)-day and 0-day p=0.1501 and between (+1)-day and 0-day p=0.1844 for the days of hospitalisation. It means, that we can say about the distinction of mean srb quantity in calm days and in hospitalisation days, with 10 - 20 % probobility

3.The effect that we described above is very clear in a sample of special days when patients were hospitalisaed and their death were in one day.

Conclusions

Natural factors impact on human health is not entirely determined by Earth weather

Solar activity parameters should be taken into account for the medical weather forecast developing.

Appendix

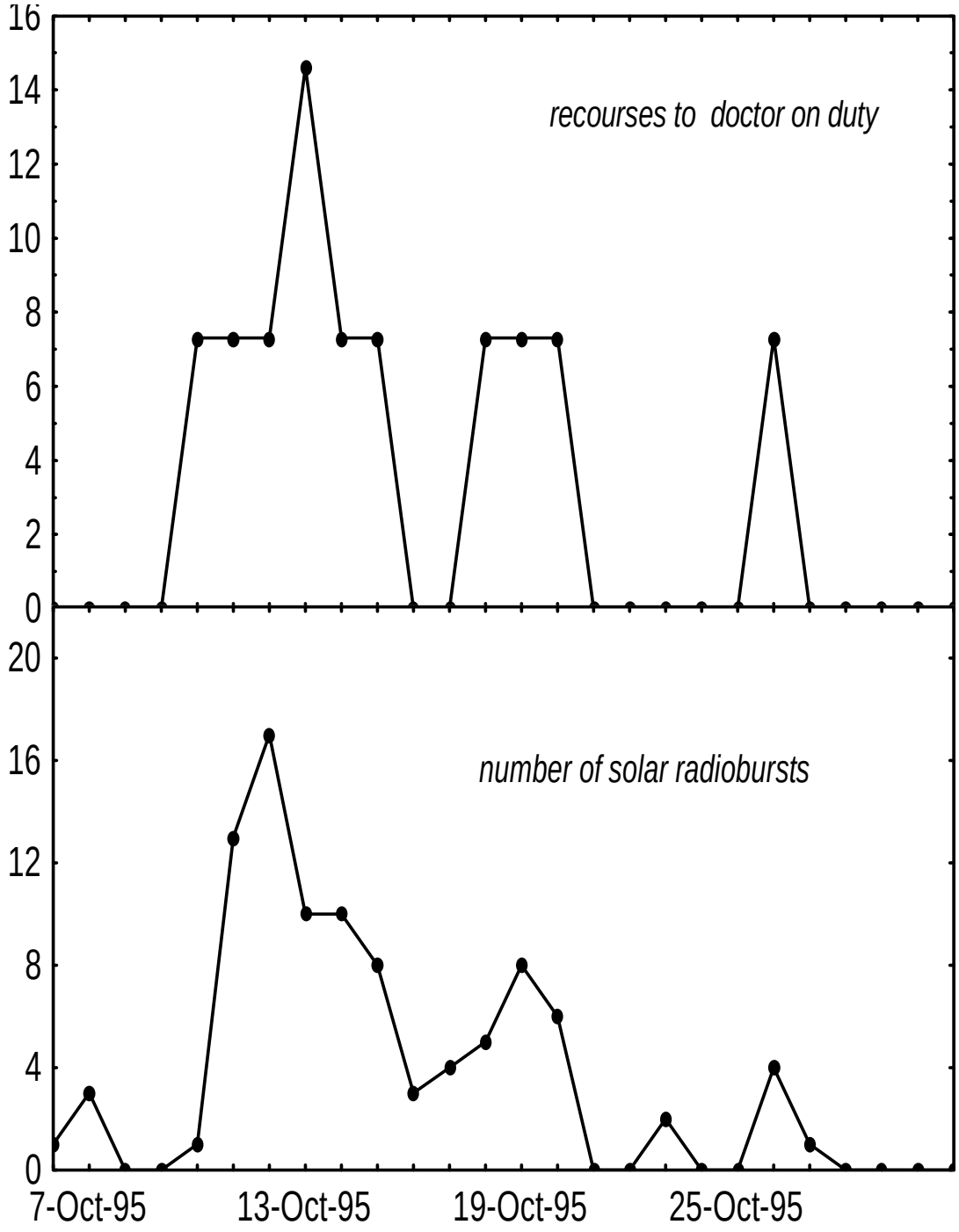

Figure 1. *The behavior of daily number of recourses to the doctor on duty in cardio-resort "Black River" and daily number of solar radiobursts (the investigation was in October 1995).*

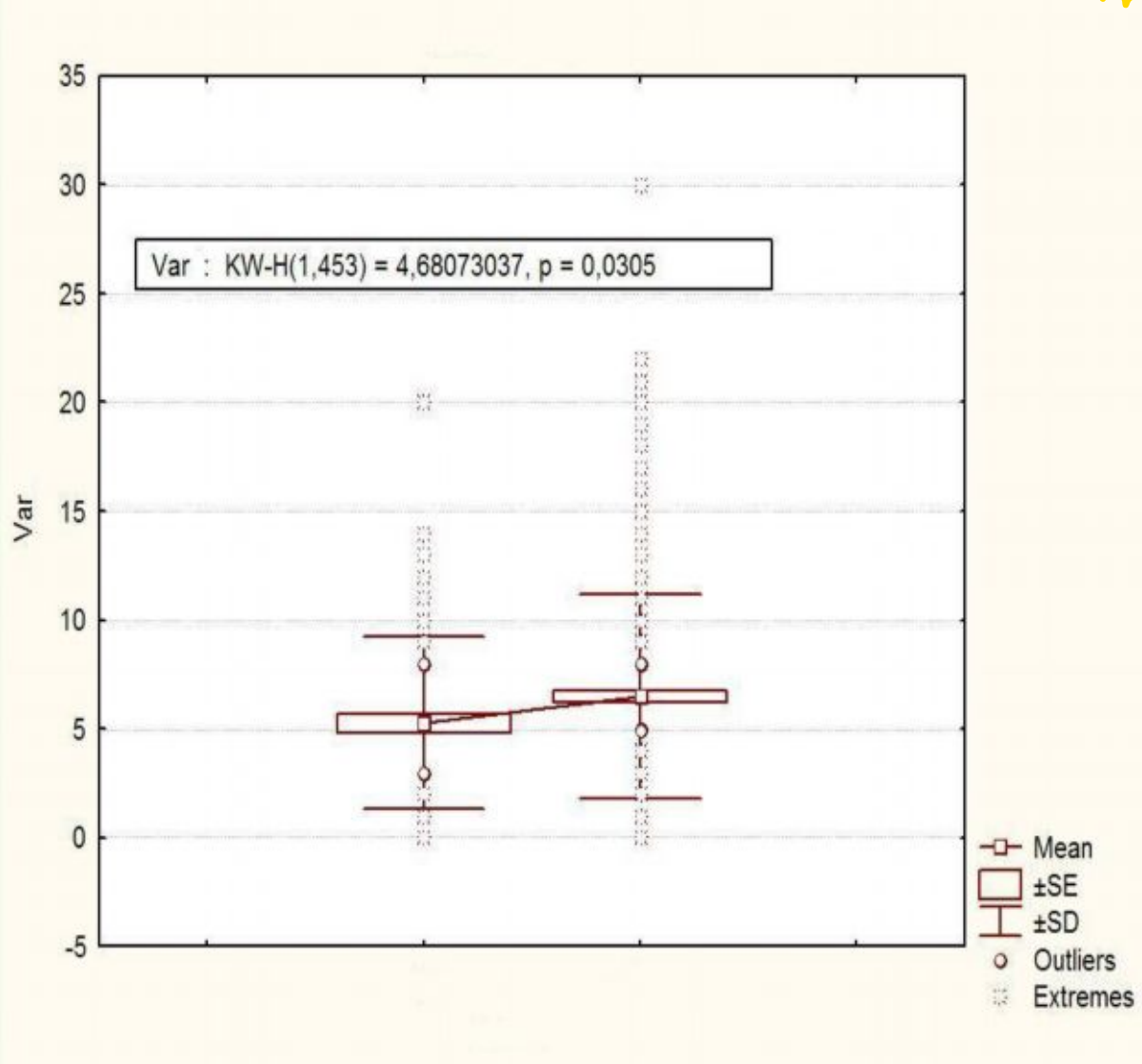

Figure 3 *Difference in amount of SRB for hospitalisation event and no-event days*

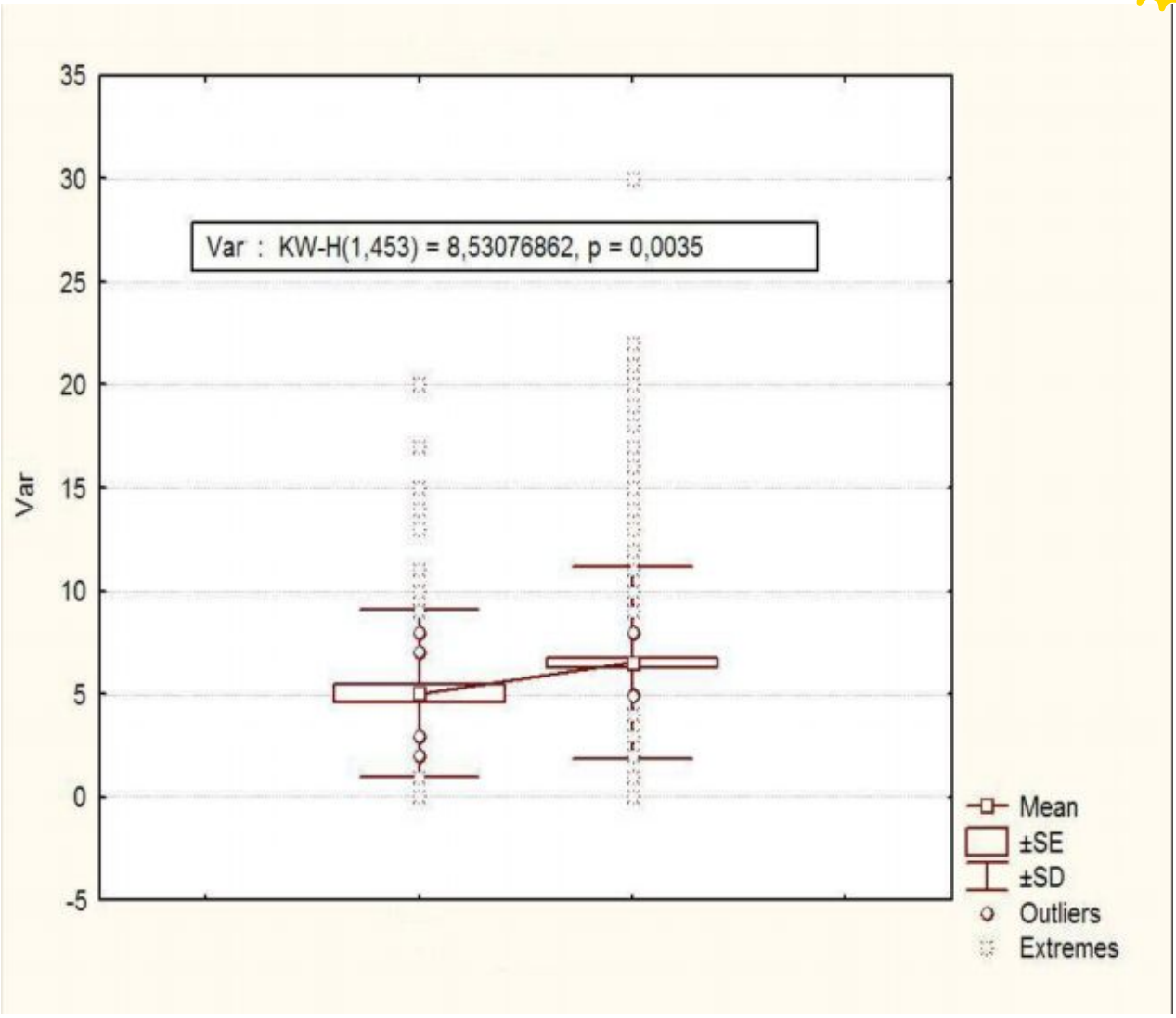

Figure 4 *Difference in amount of SRB for death event and no-event days*

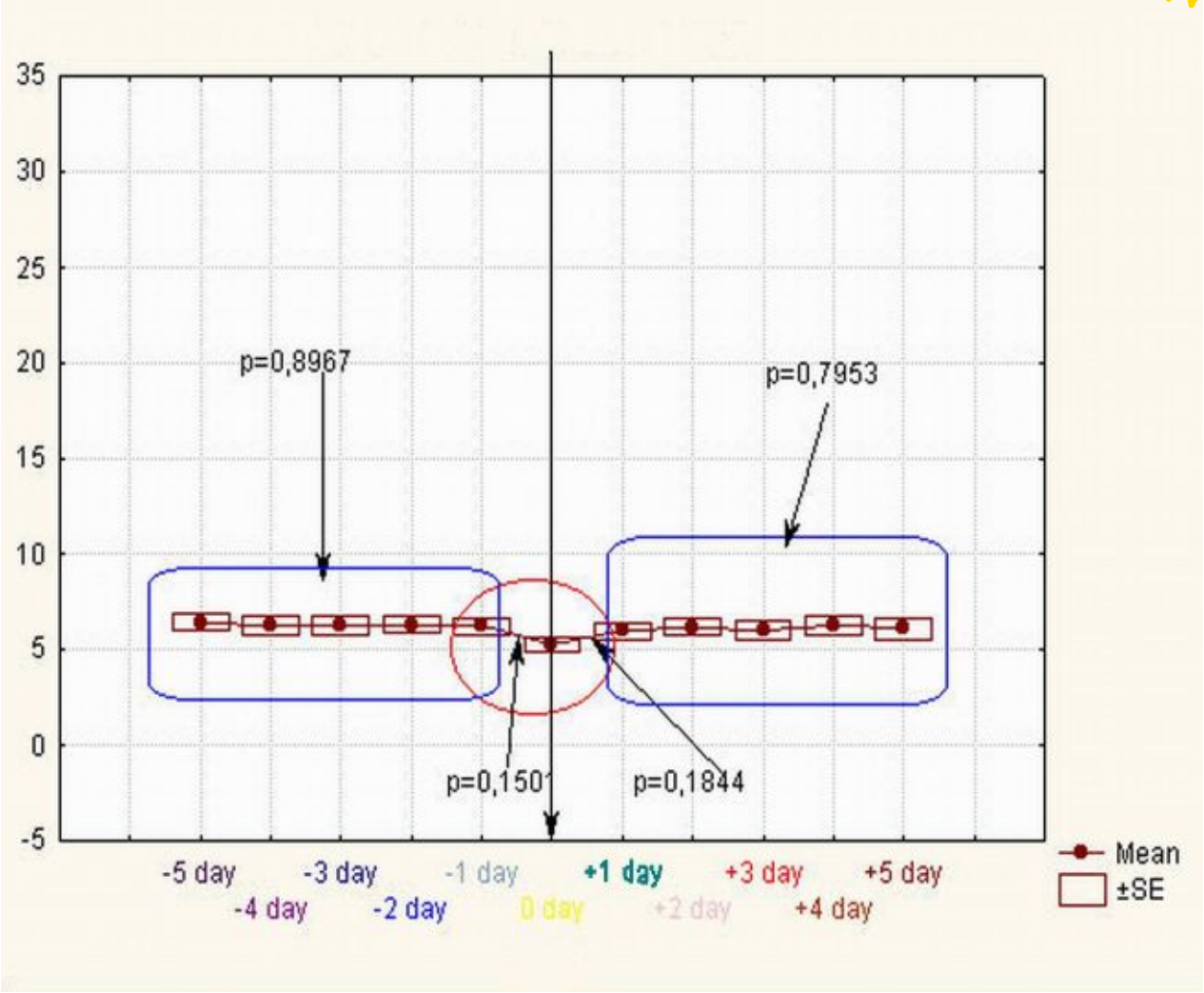

Figure 5 *SRB trend for hospitalisation pre- and post-event days*

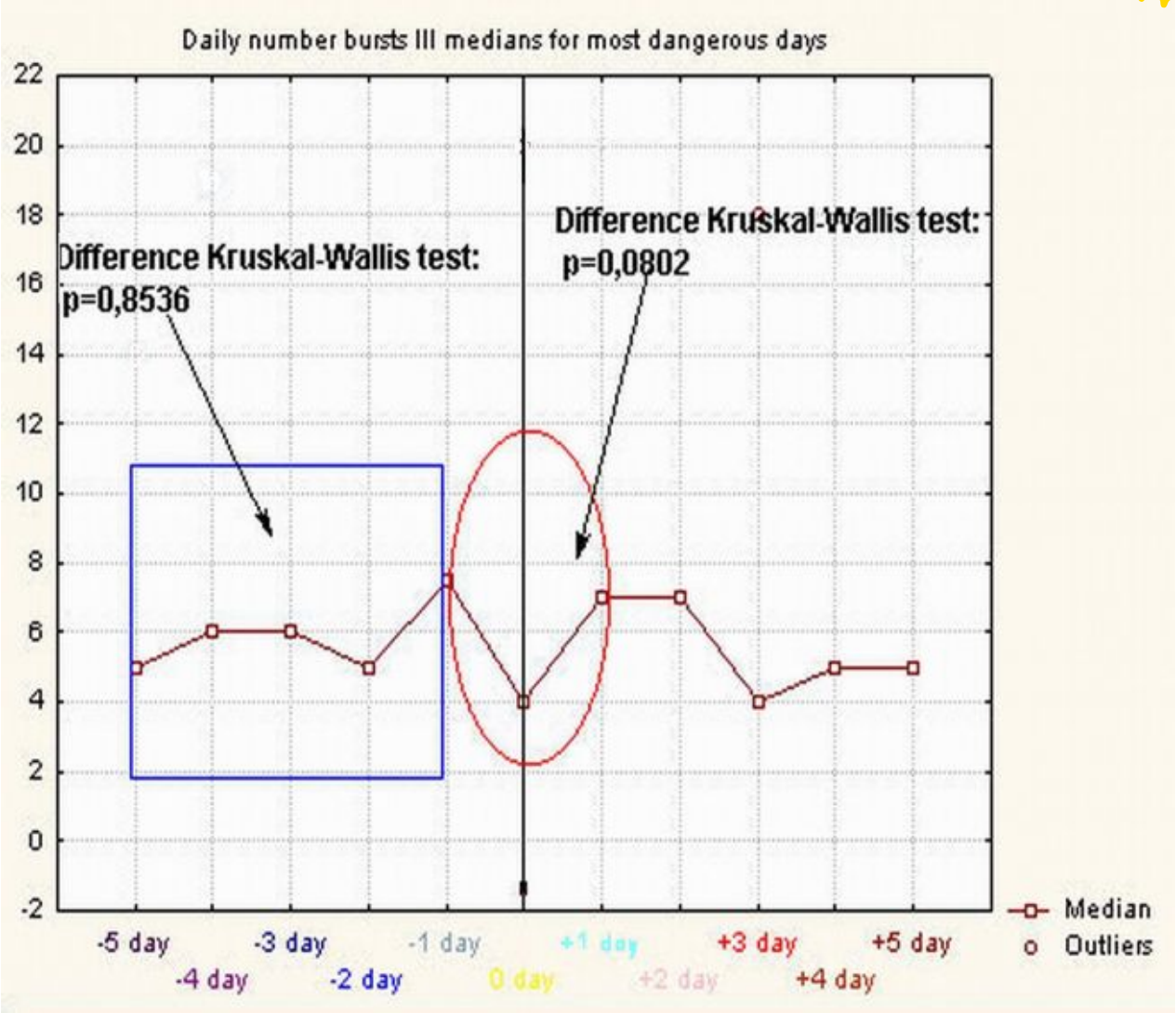

Figure 6 *SRB trend for days with sudden cardiac deaths*