

ORAL ABSTRACTS

THE FORENSIC SIGNIFICANCE OF CORE TEMPERATURE IN IDENTIFYING PRIMARY AND SECONDARY HYPOTHERMIA AS A CAUSE OF DEATH: A PILOT STUDY ON WISTAR RATS

Amina Zorlak-Čavčić^{1*}, Muhamed Katika², Emina Dervišević¹

¹ Department of Forensic Medicine, University of Sarajevo, Faculty of Medicine, Sarajevo, Bosnia and Herzegovina

² Department of Clinical Sciences of Veterinary Medicine, University of Sarajevo, Veterinary Faculty, Sarajevo, Bosnia and Herzegovina

*Correspondence:

amina.zorlak@mf.unsa.ba

This paper was presented at the 10th International Congress on Advances in Veterinary and Technics (ICAVST 2025) in Sarajevo, Bosnia and Herzegovina.

How to cite: Zorlak-Čavčić A, Katika M, Dervišević E. 2025. The forensic significance of core temperature in identifying primary and secondary hypothermia as a cause of death: A pilot study on Wistar rats. *Veterinaria*, 74Suppl(1), 79-80.

ABSTRACT

Hypothermia is defined as a body core temperature below 35 °C and can be caused by internal or external stress. Primary hypothermia is caused by excessive exposure to low environmental temperature without any medical conditions prior to that. Secondary hypothermia is caused by alteration in thermoregulation by disease, trauma, surgery, drugs, or infections. The aim of the research is to investigate core temperature values in rats subjected to specific water temperatures at five different time points. It focuses on distinguishing between primary and secondary hypothermia in these rats.

The total 21 Wistar rats were divided into three experimental groups as: Control group rats exposed only to hypothermic condition (n = 7); Alcohol + hypothermia (n = 7); and Benzodiazepines + hypothermia (n = 7). The temperature spots analyzed in the study were: normal core temperature, core temperature during injection of 0,3 ml ketamine, temperature of immersion and the temperature at the onset of hypothermia and temperature at the time of death.

In our study the comparative analysis of body temperatures at various time points following submersion in water revealed significant differences among the study groups treated with either alcohol or benzodiazepines and the control group. Notable differences were observed in baseline temperature, post-anesthesia induction temperature, and immediate post-submersion temperature. Specifically, significant differences were discovered among the alcohol and benzodiazepine groups ($p < 0.001$) and ranging from the alcohol and control groups ($p < 0.001$). The analysis of survival times following induced hypothermia revealed a statistically significant difference among the three experimental groups ($p = 0.04$), though subsequent post-hoc comparisons did not demonstrate significant differences in mean survival times.

There is a difference in survival time between primary and secondary hypothermia groups, depending on consumption and intoxication with alcohol or benzodiazepines. The analysis of survival times following induced hypothermia showed a statistically significant difference among the groups.

Keywords: Forensic, Hypothermia, Primary, Secondary, Survival time

SUDSKO-MEDICINSKI ZNAČAJ TEMPERATURE TIJELA U IDENTIFIKACIJI PRIMARNE I SEKUNDARNE HIPOTERMIIJE KAO UZROKA SMRTI: PILOT STUDIJA NA PACOVIMA SOJA WISTAR

SAŽETAK

Hipotermija se definiše kao pad unutrašnje tjelesne temperature ispod 35°C, a može nastati kao posljedica vanjskih uticaja ili poremećaja u organizmu. Primarna hipotermija rezultat je direktnog izlaganja hladnom okruženju bez prethodnih zdravstvenih problema, dok sekundarna hipotermija nastaje zbog oslabljenog mehanizma termoregulacije usljed bolesti, traume, farmakoloških sredstava, infekcija ili hirurških intervencija. Cilj ovog istraživanja bio je analizirati promjene centralne tjelesne temperature kod pacova izloženih određenim temperaturnim uslovima vode, u više vremenskih tačaka, kako bi se procijenile razlike između primarne i sekundarne hipotermije.

Ukupno 21 pacov soja Wistar bio je podijeljen u tri eksperimentalne grupe: kontrolnu grupu, koja je bila izložena samo hipotermijskim uslovima ($n = 7$), grupu koja je bila pod uticajem alkohola i hipotermije ($n = 7$), te grupu koja je bila pod uticajem benzodiazepina i hipotermije ($n = 7$). Temperature koje su analizirane su: fiziološka tjelesna temperatura, temperatura tokom injekcije 0,3 ml ketamina, temperatura prilikom uranjanja u vodu, temperatura na početku razvoja hipotermije, te temperatura u trenutku smrti.

Dobijeni rezultati pokazuju značajne razlike u dinamici tjelesne temperature između grupa koje su bile pod uticajem alkohola ili benzodiazepina u poređenju sa kontrolnom grupom. Posebno su bile izražene razlike u početnoj temperaturi, temperaturi nakon anestezije i neposredno nakon izlaganja hladnoj vodi. Statistička analiza je pokazala izrazito značajne razlike između grupe s alkoholom i one s benzodiazepinima ($p < 0,001$), kao i između alkohola i kontrolne grupe ($p < 0,001$). Također, utvrđena je statistički značajna razlika u vremenu preživljavanja među sve tri eksperimentalne grupe ($p = 0,04$), iako naknadne post-hoc analize nisu potvrdile značajne razlike u prosječnim vremenima preživljavanja.

Na osnovu provedenog istraživanja može se zaključiti da konzumacija alkohola i benzodiazepina utiče na tok i ishod hipotermije, što se ogleda u razlikama u vremenu preživljavanja između pacova sa primarno i sekundarno izazvanom hipotermijom. Ove razlike su statistički potvrđene i ukazuju na potencijalnu forenzičku vrijednost analize centralne tjelesne temperature prilikom utvrđivanja uzroka smrti.

Ključne riječi: Hipotermija, primarna, sekundarna, sudska medicina, vrijeme preživljavanja