

Assignment #1: Research Proposal and Annotated Bibliography

Emily. D. Dagasso

Thompson Rivers University

Communications 2300-01

Susan Buis

February 9, 2021

Part A

The regulation of our body temperature is both an intrinsic and essential ability falling under the hypothalamus' responsibility. A healthy body functions at an internal body temperature of approximately thirty-seven degrees Celsius, but also fluctuates while adapting to environmental conditions (HealthLink BC, 2020). For instance, an elevated body temperature above thirty-eight degrees Celsius is considered to be fever, a known symptom of several health conditions. In the event of an infection, the body heats up in response to fight off foreign invaders, such as bacteria, who cannot survive high temperatures. Although the increasing of body temperature is widely known to be beneficial, a significant and persistent fever stresses the body, causing increased metabolic rate, heart rate and oxygen consumption (Lee, et al., (2012). This excess bodily strain is believed to result in mortality for some patients, causing health practitioners to look towards antipyretics (Byung et al., 2012). The usage of antipyretics is considered a controversial topic amongst the scientific community as the "evidence of the benefits or harms of fever suppression with antipyretics in patients with bacteremia remains inconclusive" (Dai et al., 2015, 470). Often, new complications arise with an excessive reduction of body temperature which hinders the immune response to the infection. For example, patients who presented hypothermic symptoms to critical illnesses had a much higher risk of mortality, according to research conducted by Rumbus et al. (2017). Therefore, the delicate balance of internal body temperature to effectively terminate bacterial growth continues to be elusive for scientists across the globe.

Hence, the objective of my research is to understand how body temperature affects bacterial growth in humans and determine if antipyretics affect the mortality rate. As bacterial infections are prevalent across the globe, every human being will benefit from the continued investigation of the association between body temperature and mortality. Despite the commonality of this illness, studies to date have lacked detailed clinical information or have been limited by the small number of patients included in the study. Therefore, a comprehensive review of literature on this topic will illustrate the proposed theory that deviations from the normal body temperature can predict the outcome of a patient's infection.

Part B

Lee, Byung Ho, et al. (2012). Association of body temperature and antipyretic treatments with mortality of critically ill patients with and without sepsis: multi-centered prospective observational study. *Critical Care*, 16(1). <https://doi.org/10.1186/cc11211>.

The understanding of the bodies integral defense mechanisms is crucial for the treatment of patients with severe infections. This research explored the delicate relationship between regulating body temperature with antipyretics, fever reducing agents, and mortality. The study included 1,425 adult critically ill patients and recorded four-hour body temperature and antipyretic treatments until ICU discharge. Within the study, the researchers conclude that within non-septic patients a “high fever [greater than 39.5 degrees Celsius] is independently associated with mortality” (para. 4). However, there were no distinct correlations between fever and mortality found within non-septic patients. Further, the researchers found no association of antipyretics with mortality in non-septic patients, whereas within septic patients the application of antipyretic therapy indicated an increase of mortality rate. Although a great advantage of this research was the substantial size, twenty-five different hospitals with a total of fourteen hundred and twenty-five patients, the timing and method of collecting body temperature data was not standardized, creating a concerning limiting factor. As concluded in the study the researchers emphasize the correlations of fever and antipyretics with mortality and the differences with and without infectious diseases. Therefore, this research benefits my review as it provides a distinct observation in which patients will benefit from antipyretics.

Dai, Yu-Tzu, et al. (2015). Correlation Between Body Temperature and Survival Rate in Patients with Hospital Acquired Bacteremia: A Prospective Observational Study. *Biological Research for Nursing*, 17(5), 469-477. <https://doi.org.exproxy.tru.ca/10.1177/1099800414554683>.

Within this study Dai et al. reviews and clearly distinguishes the significance of an increase of temperature, typically known as the febrile response, and its distinct connection to mortality. This study included 502 adult patients that were diagnosed with bloodstream infections for data analysis with temperatures taken every four hours. It was determined within the research that immune competence is directly related to a strong febrile response. The report concludes that there is a “negative association between [maximum body temperature] and mortality” (p. 470) Specifically, the findings indicate that with every one-degree Celsius increase in max body temperature there is a twenty-eight percent decrease in mortality. However, due to insufficient evidence the researchers were unable to find a definite association between the use of antipyretics and mortality, or the presence of chills and mortality. Overall, this report depicts the major implications of a fluctuating body temperature in patients with hospital acquired bacteremia. Thus, this research supports my study due to the associations presented between extreme changes in body temperature and mortality.

Rumbus, Zoltan, et al. (2017). Fever Is Associated with Reduced, Hypothermia with Increased Mortality in Septic Patients: A Meta-Analysis of Clinical Trials. *PLOS ONE*, 12(1). <https://doi.org/10.1371/journal.pone.0170152>.

The research conducted by Rumbus et al. focused on the fundamental association between the deviations in body temperature and mortality, specifically in patients diagnosed with sepsis; a severe bloodstream infection. This study performed a literature review utilizing the following databases and included papers that used Medical Subject Headings and specific search terms. The included databases

were PubMed, EMBASE, and Cochrane Controlled Trials Registry. Within the report, the researchers concluded that there is a strong “negative linear correlation between [body temperature] and mortality rate” (p. 1). The considerable research of septic patients indicated fever predicts lower mortality rates, whereas hypothermia promotes mortality. Further, due to the variety of publications included there are some limitations. In particular, the body temperature measurements were not regulated, and “performed in different ways and not at the same time points” (p.11). Altogether, within this study Rumbus et al. distinguished the correlation between body temperature and mortality in septic patients through the use of statistical analysis. This literature is a valuable source for future reference as it aids in predicting the prognosis of an individual and demonstrates the effectiveness of the immune system against a bacterial infection when body temperatures are within extreme levels.

Young, Paul. J., et al. (2012). Early peak temperature and mortality in critically ill patients with or without infection. *Intensive Care Medicine*, 38, 437- 444. <https://doi-org.exproxy.tru.ca/10.1007/s00134-012-2478-3>

This study evaluated the independent association between peak temperature and in-hospital mortality of individuals diagnosed with infections. Being an adaptive response to infection, fevers are known to strengthen the body’s defences towards said infection and increase the odds of survival. Although beneficial for infections, Young et al. hypothesized the presence of a fever in patients with non-infection-related admission diagnosis will increase the chances of mortality. The study employed two databases, being the ANZ and UK, to perform statistical analysis on the relevant data. It was determined for both the infection and non-infection groups, “increasing degrees of hypothermia were associated with progressively increasing mortality” (p.441). Further, for the infection group the results indicated with the increasing of peak temperature the risk of in-hospital mortality was substantially reduced, with the opposite being true for the non-infection group. The findings of this study prove the proposed hypothesis to be correct, the development of fever can be beneficial to patients diagnosed with infection but can be

detrimental in patients without infection. Therefore, this distinction made between the two diagnosis is critical for future review and aids in the understanding of the febrile response.

References

HealthLink BC. (2020). Body Temperature. <https://www.healthlinkbc.ca/medical-tests/hw198785>