Suppose you were presented with the results of a study comparing a vegetarian diet to a meat diet. You are told 160 volunteers were randomly assigned to the two diets so that 80 were on the vegetarian diet and 80 were on the meat diet. At the end of 4 months, the blood pressures are checked and a difference of 12 mm Hg in mean systolic blood pressure is found between the two groups. The investigator reports that a two sample t-test shows this difference is statistically significant.

How do you interpret these findings?  Critique this study.  What additional information would be helpful?  What questions or concerns do you have? Are these results conclusive?  How might this type of study be improved?  Define a study objective of your choosing, and discuss study design considerations.

If the study conducted a two sample t-test and concluded that the results are statistically significant, I would not assume that this means they are practically significant. A mean 12 mm Hg for systolic blood pressure does not indicate poor or above average health. First off, if a t-test is being done, then we must assume normal distribution. However, we’d like to see the data and know in fact if this is the case. If I was doing this study, I would want to know what the people studied ate just before the taking their blood pressures. What was their environment like? Did they come in already stressed about something? All of these would fluctuate the numbers that the blood pressure reader could produce. In addition, the study would need to outline what it’s trying to prove. If the study is trying to indicate overall health, having only systolic blood pressure is not good enough to make this study’s results a practical indicator.

For example, if I wanted to identify the best basketball player in the fourth quarter. In order to do this, I’ve only identified points scored in the fourth quarter as a variable. This is not good enough to prove the study is correct. A player with a significant amount of points in the last quarter does not mean he’s the best player. There are other factors that come into play. Such as, is he on a good team or a bad team. If he’s the sole good player on a bad team, he’s getting up more shots, more shots equal more opportunities for points. Is the team that the player is on, is that team so good that the amount of time the starters play in the quarter are towards the bottom in comparison to his peers. The value of mean difference could be statistically significant but that necessarily does not prove who is the best player in the fourth quarter.

If I was conducting this study, I’d make sure that my sample size is large enough to first leverage normal distribution. In addition, when conducting a two sample t-test it’s important to also identify the level of confidence and the Type 1 error rate.