Next-to-skin sportswear are generally produced from knitted stretch fabrics, which get extended on wearing and remain in the extended state. Since they are worn next to skin and are direct contact with the body surface, their thermal comfort properties are effective on overall clothing comfort. In this paper, an investigation has been made to evaluate the effect of garment fit and fabric extension on the thermal transfer performance of clothing. The method using the combination of infrared thermal camera and 3D virtual garment simulation has been developed considering the fabric extension and clothing surface temperature of different body parts. Two type T-shirts were produced by changing the bust and waist measurements and their thermal transfer performance were investigated in wear trials on subjects having different size. Fabric extension results were taken from virtual avatar in 3D simulation having the same body measurements as subjects. Temperatures changes on different body parts according to the wearing protocol were investigated in thermal camera software (Flir Tools). The experimental results show that compression garment fit and fabric extension influence the heat transfer and clothing surface temperatures. In the sportswear industry, optimal garment fit should be defined for designing sportswear, especially for performance sportswear.