INTRODUCTION

Prior research has shown sock ply is not a direct indication of sock thickness across different materials[1]. This study is an expansion of previous research to examine the effect of normal use on sock thickness and elasticity.

METHOD

Subjects: A total of 37 used socks from 20 subjects were tested over a 9 month period. Sock age ranged from 0.5 to 60 months (Mean 10, SD 16) and Ply ranged from 1 to 6 (Mean 3, SD 2).

Procedures: Sock stretch while donned was marked and measured both axially and circumferentially when patients entered the lab. Socks were doffed and placed into a knitting hoop, replicating the measured stretch. Thickness was measured at pressures from 4 to 100kPa using an apparatus and data analysis method described in a previous publication[1].

RESULTS

The mean donned sock stretch was 11.5% for single fiber socks (SD 3.8, range 2.0 - 13.1) and 24.6% (SD 15.2, range 11.1 - 53.9) for multi-fiber. The average single fiber sock was 15 months old and 59% (SD 16%) of its original thickness. Multi-fiber socks were 6 months old on average and 41% (SD 19%) of their original thickness.

Uncompressed thickness of used socks decreased significantly relative to new socks and had the appearance of becoming thin and stiff (Figure 1). However, the average sock stress-strain response between new and used socks was roughly constant for both single and multi-fiber socks (Figure 2).

DISCUSSION

The larger and less predictable loss of thickness seen in multi-fiber socks compared with single fiber socks may be a result of wear to the soft synthetic components (e.g., Lycra® Spandex) woven into most multi-fiber socks[1]. However, even with the more consistent aging of single fiber socks, we still did not see a strong quantitative trend relating reduction of sock thickness to time. In future studies activity during sock use will be monitored in an effort to develop a model to predict sock thickness reduction based on sock model, age, and wearer activity.

CLINICAL APPLICATIONS

In clinical practice single fiber socks such as wool and cotton are prescribed on a per patient basis. They require specific measurements and individual orders. Synthetic multi-fiber socks are typically purchased in bulk over a limited number of sizes (S, M, L, etc). Their stretchability makes them easy to conform to a wide range of limb sizes with no measurement. While multi-fiber socks are easier to fit and less expensive, their lifespan is usually shorter and less consistent. Since socks are only reimbursed for bot single fiber socks, only 1 of 6 socks had reduced to less than 50% and it was 5 years old.

REFERENCES