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ON INVESTIGATION OF TENSILE STRENGTH OF COMMERCIAL SYNTHETIC NON-ABSORBABLE SUTURE MADE FROM OF BLUE POLYPROPYLENE MONOFILAMENT

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ABSTRACT

Objective: The purpose of this research is to investigate the tensile strength of commercial synthetic non-absorbable suture made from blue polypropylene monofilament that commonly used in surgery.

Methods: The commercial synthetic non-absorbable made from blue polypropylene monofilament was prepared for this purpose. The ASTM C1557-03 was used as a standard the method for analysis. For accuracy of the measurement, the diameter of the sutures was measured using optical microscope. The tensile strength, strain at failure, and modulus elasticity of the sutures were measured following instruction from the standard test method. The graph strain versus stress was provided.

Results: Results show that that the average tensile strength of five valid tested samples is about 875.812 MPa. The average strain is found about 0.282. The average of modulus of elasticity is 4026.069 MPa.

Conclusion: It is concluded that the sutures of commercial synthetic non-absorbable suture made from blue polypropylene monofilament having linier elastic as well as plastic properties. The average tensile strength of five valid tested samples is about 875.812 MPa. The average strain at failure is found about 0.282. The average of modulus of elasticity is 4026.069 MPa.

Keyword: Tensile strength, Synthetic, Non-absorbable, Sutures, Blue, Polypropylene, Monofilament.

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INTRODUCTION

Suture material is classified either as non-absorbable or absorbable. A non-absorbable suture material is much more slowly broken down over many months, and modern synthetics are much more inert. Non-absorbable sutures have high tensile strength, but lose between 10% and 15% of the tensile strength every year. It is a relatively elastic material and causes minimal tissue inflammation. And similarly non-absorbable sutures do not cause much tissue reaction. Absorbable suture is defined as suture that loses most of its tensile strength. The time it takes to be degraded in tissue varies by type of material. It has a high tensile strength, but the tensile strength decreases as the suture mass is absorbed. The absorbable sutures are available in monofilament or braided varieties [1].

The application of suture in surgery is very important, ranging from fascia, repair of tension band of fractures, joint capsules, and closure of surgical wounds, muscles, tendon, or ligaments. The quality of repair depends on variables such as the surgical technique, material properties suture, and tissue characteristics. The types of material that is used for suture have important implications in tissue repair. Adverse surgical outcomes can be avoided by selecting suitable suture materials [11]. Table 1 is a list of material for sutures obtained from previous publication.

Evaluations of suture are conducted continuously by group of purchasing organizations. The purchasing commission conducts research to survey materials managers, surgeons, and operating room supervisors, at member hospitals regarding their rating of product's clinical acceptability and their vendor preference [12]. These data will assist the surgeon in selection and application of appropriate suture materials to specific tasks [11].

The important properties of sutures are provided adequate tension for wound closure and non-reactivity for the least inflammatory response [13]. The purpose of this work is to provide the tensile strength data of commercial synthetic non-absorbable sutures made from blue polypropylene monofilament. The data of failure strain and modulus elasticity are also provided for consideration of the user.

METHODS

Commercial synthetic non-absorbable suture made from blue polypropylene monofilament was prepared in this research for tensile strength investigation. The suture was under trademark Corleone from the company of Peter Surgical, France.

The tested material was extracted from sterile packaging and referred from instruction from previous publication [13]; the samples then were immersed in alcohol for 1 day.

The average of the diameter sample measurements represented the mean diameter value for each material investigated as explained in previous publication [13]. The diameter measurements were performed on each sample of material at three different equidistant points of the sutures. The diameter of the sutures was measured using optical microscope (Olympus SZH 10).

Tensile testing has been performed to evaluate the tensile strength of sutures. The modulus elasticity (E) and strain (ε) are also presented. Five times repetition of valid tensile tests were conducted and average value of tensile test will be provided. The tensile strength test analysis has been carried out following standard test method for tensile strength