เปรียบเทียบค่าเปอร์เซ็นต์อีเจคชั่นแฟรคชั่น โดยวิธีอีเอสเทคกับการตรวจหัวใจด้วยคลื่นเสียงความถี่สูง
The Comparative Study of Ejection Fraction Percentage Between ES Teck and Echocardiography

Mom Luang Tannapat Devakula

พญ.ม.ล.ธัญญ์นภัส เทวกุล[1], ดร.กานต์ วงศ์ศุภสวัสดิ์[2]
[1]นิสิตระดับปริญญาโท, [2]อาจารย์

นิสิตระดับปริญญาโท สาขาวิชาเวชศาสตร์ชะลอวัย และฟื้นฟูสุขภาพ มหาวิทยาลัยแม่ฟ้าหลวง

บทคัดย่อ

วัตถุประสงค์ของการศึกษาครั้งนี้เพื่อวัดความสัมพันธ์ระหว่างเครื่องอีเอสเทคกับการ ตรวจหัวใจด้วยคลื่นเสียงความถี่สูงจากค่าเปอร์เซ็นต์อีเจคชั่นแฟรคชั่น เพื่อประเมินความถูกต้องและความแม่นยำของเครื่องอีเอสเทคที่เป็นเครื่องมือทางการแพทย์ที่มีเทคโนโลยีที่ทันสมัย

วิธีการศึกษา มีผู้เข้าร่วมโครงการทั้งหมด 75 คน เป็นเพศชายและเพศหญิงที่มีอายุตั้งแต่ 35 ปีขึ้นไป ที่มาตรวจสุขภาพโปรแกรมทองของโรงพยาบาลเวชธานี ใช้เวลาในการเก็บข้อมูลนาน 3 เดือน โดยบันทึกค่า เปอร์เซ็นต์อีเจคชั่นแฟรคชั่นที่ได้จากเครื่องอีเอสเทค และเครื่องที่ตรวจหัวใจด้วยคลื่นเสียงความถี่สูงที่ทำในวันเดียวกัน

ผลการทดลอง พบว่าค่าเปอร์เซ็นต์อีเจคชั่นแฟรคชั่น ระหว่างเครื่องอีเอสเทคกับการ ตรวจหัวใจด้วยคลื่นเสียงความถี่สูง มีความ ความสัมพันธ์กันอย่างมีนัยสำคัญ ($p<0.05$, $r=0.312$) ที่ระดับความเชื่อมั่นที่ 95% และเมื่อทำการศึกษาโดยเลือกนำค่าเปอร์เซ็นต์อีเจคชั่นแฟรคชั่นในช่วงที่ปกติ (55–75%) มาวิเคราะห์ ก็พบว่า เครื่องอีเอสเทคกับการ ตรวจหัวใจด้วยคลื่นเสียงความถี่สูงมีความ ความสัมพันธ์กันมากขึ้นอย่างมีนัยสำคัญ ($p<0.01$, $r=0.482$) ที่ระดับความเชื่อมั่นที่ 99% ในขณะที่เมื่อนำค่าเปอร์เซ็นต์อีเจคชั่นแฟรคชั่นในช่วงที่ผิดปกติ (< 55% หรือ > 75%) มาวิเคราะห์ ก็ยังพบว่า เครื่องอีเอสเทคกับการ ตรวจหัวใจด้วยคลื่นเสียงความถี่สูงมีความความสัมพันธ์กันอย่างมีนัยสำคัญ ($p<0.1$, $r=0.214$) แต่ที่ระดับความเชื่อมั่นที่ 90%

สรุปผล เครื่องอีเอสเทคเป็นเครื่องมือทางการแพทย์ที่ให้ค่าเปอร์เซ็นต์อีเจคชั่นแฟรคชั่น ที่ถูกต้องและแม่นยำเมื่อเปรียบเทียบกับการ ตรวจหัวใจด้วยคลื่นเสียงความถี่สูง และเครื่องอีเอสเทคมีความน่าเชื่อถือมากขึ้นเมื่อค่าเปอร์เซ็นต์อีเจคชั่นแฟรคชั่นออกมาปกติ ดังนั้นเครื่องอีเอสเทคถือว่าเป็นเครื่องมือที่มีประโยชน์ในการช่วยคัดกรองโรคหัวใจก่อนที่คนไข้จะมีอาการได้

คำสำคัญ อีเอสเทค, การตรวจหัวใจด้วยคลื่นเสียงความถี่สูง, เปอร์เซ็นต์อีเจคชั่นแฟรคชั่น

ABSTRACT

The objective of this study was to measure the correlation between ES Teck and echocardiography in the ejection fraction percentage to evaluate the accuracy and precision of new technology medical device of ES Teck.

Materials and Methods : 75 Male and Female subjects with the age of 35 years or above who attended gold package for health check up at Vejthani Hospital were recruited. The data was kept for three months to record the ejection fraction percentage of ES Teck and echocardiography in the same day. Correlation of the data obtained were analyzed by using Pearson correlation test.

Results: The correlation of all ejection fraction percentage (%EF) between ES Teck and echocardiography were significantly correlated ($p<0.05$, $r=0.312$) at confident interval of 95%. Moreover in normal %EF (55-75%), result showed very significant correlated ($p<0.01$, $r=0.482$) at confident interval of 99% whereas the result in abnormal %EF was also correlated with statistical significant but in different confident interval (90%).
Conclusion: ES Teck was a medical device that give an accurate %EF as compared with echocardiography. It had a very strong reliable in the normal range of %EF. Therefore, ES Teck was a beneficial device to determine the heart failure by the screening of %EF. ES Teck concluded to be the pre-screening device to evaluate the heart condition before the patients face the symptoms of heart diseases accordingly. Also, ES Teck can be used as a guideline to assist the physician in selecting the proper management for the patient.
Keywords: ES Teck/Echocardiography/%Ejection Fraction (%EF)

Introduction

From World Health Organization, in year of 2008, reported that top 10 cause of death in the world was ischemic heart disease followed by stroke and other cerebrovascular disease. Globally, many peoples got a degenerative disease in the younger age. Their common risk factors as we know were overweight or obesity, sedentary lifestyle, unhealthy diet, tobacco smoked, overused of alcohol, rising of blood pressure, blood sugar and cholesterol or triglyceride. All these factors were the leading cause of cardiovascular disease.

When the peoples got sick, they tried to seek out the best care that was harmless and useful to them. Thus, to reduce the side effect and reach to the benefit of compliance, new drugs had been manufactured. Also, many medical instruments from worldwide market were invented to promote the maximum accuracy, safety to the user and took less time to test in order to detect an early abnormality of the diseases.

For the cardiovascular diseases, there were many standard instruments that could detect the heart and vascular problem. For example, electrocardiography (EKG) used to screen the abnormality of heart rhythm or ischemic pattern. Exercise Stress Test (EST) was more accurate to detect the severity of ischemia than electrocardiography. But in EST, the patient needed to used a high exertion of energy to achieved testing time. Another instrument was the echocardiography which simply called Echo. It was the ultrasound of the heart. It could help to screen the heart chamber or abnormalities of heart valve. This test would be more comfortable to test in the elderly patients or those who had the joint problems. It measured the ejection fraction percentage (%EF) that used to determines how well your heart pumps with each beat. EF was associated with systolic dysfunction. Therefore, patients with heart failure usually reduced the ejection fraction.

Nowadays, there were many patients running through the Universal Health Coverage Service from Ministry of Public Health in Thailand. In 2009, the ratio of Thai healthcare practitioner to patient was 1: 1,985 patients in the public hospital. Thai healthcare practitioner needed to work harder and more carefully on the patient's management against the time in order to get the right diagnosis and treatment. Therefore, the aim of this research was to seek out how to screen an early abnormality prior signs and symptoms begin. Nowadays, there were plenty of new technology in the medical tools that could initially screen the optimal health profiles. If this medical tools were working well, it could help the healthcare practitioner to reduce the misdiagnosis.

This research was designed based on the above rationale to study the correlation between new medical technology instrument with standard instrument. If these two instruments had statistically significant correlation, these could help the healthcare practitioner to initially screen the cardiovascular condition.

Objectives

To measure the correlation between ES Teck and echocardiography in the ejection fraction percentage.

Study design and research methodology

75 Male and Female subjects with the age of 35 years or above who attended gold package for health check up at Vejthani Hospital were recruited. Subject needed to examine echocardiography first and wait for 30 minutes to examine the ES Teck in the same day. After the exam, the subjects filled the Self-assessment Satisfaction Questionnaire

Statistical analysis

Statistical analysis was conducted to compare the %EF obtained from both method (instruments). Pearson correlation tests are used. Self-assessment satisfaction questionnaire analyzed by using descriptive statistics.

Results

Result of the study was analyzed and reported in three section, subject charactereristics data, study result and patient satisfaction.

Table 1 Subject Characteristics

			N = 75(%)
Gender	Male		24(32%)
	Female		51(68%)
Age	Age Gr. 1	35-44	9(12%)
	Age Gr. 2	45-54	20(26.7%)
	Age Gr. 3	55-64	23(30.7%)
	Age Gr. 4	65-74	19(25.3%)
	Age Gr. 5	> 75	4(5.3%)
	Min 35	Max 86	Mean±SD 57.96 ±11.735
Nationality	Thai		6(8%)
	Arab		69(92%)

Subjects were mostly female, 68%. Age range were in range of 35-86 years of age, with a mean of 57.96 years of age. Nationality were mostly Arab, 92%.

Data analysis showed the result of normal distribution by Kolmogorov-Smirnov Test. The correlation for parametric variables was analyzed by using Pearson correlation test. The correlation of all ejection fraction percentage (%EF) between ES Teck and echocardiography were significantly correlated ($p<0.05$, $r=0.312$) at confident interval of 95% as shown in Table 2. In normal value %EF (55-75%) result showed very significant correlated ($p<0.01$, $r=0.482$) at confident interval of 99%. In the correlation result of abnormal value of %EF (<55% or > 75%) is not significant correlated at the confident interval of $P<0.05$ ($p = 0.095$).

Table 2 Correlation of %EF between ES Teck and Echo

Correlation of %EF in ES Teck vs Echocardiography	**r ****	**p *****
N = 75 (All Subjects)	0.312	p=0.003 *
N = 36 (Subjects of Normal %EF)	0.482	p=0.001 *
N = 39 (Subjects of Abnormal %EF)	0.214	p=0.095

* Significant

** r = degree of correlation

*** p = p-value

In subject self assessment data, this research were analyzed by using the descriptive statistic.

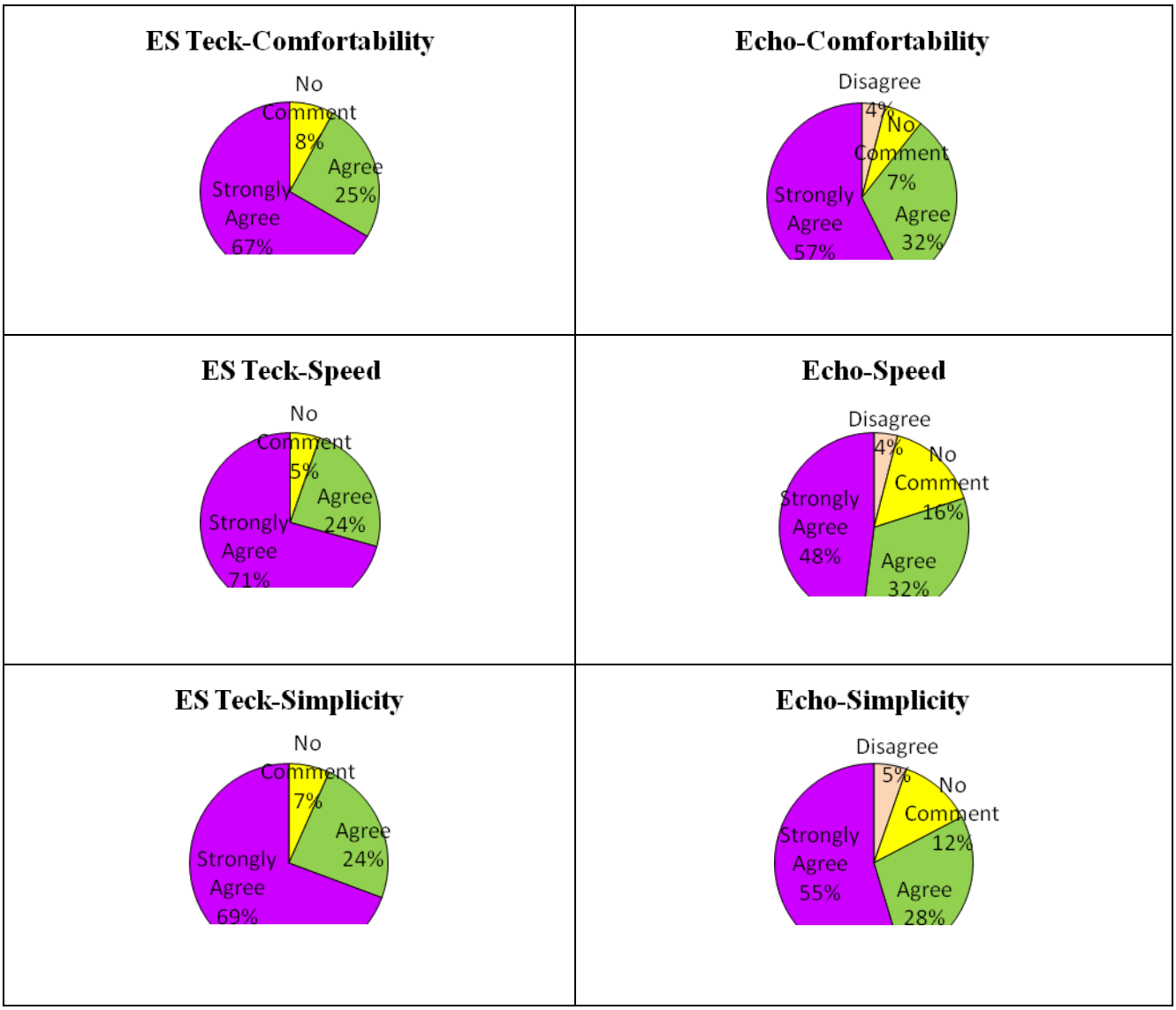

Figure 1 Satisfaction Data between ES Teck and Echo

The data were divided into two parts. The first part evaluated on the satisfaction of procedure between ES Teck and echocardiography on comfortability, speed and simplicity as shown in figure 1. Subjects were strongly agreed on comfortability in ES Teck (67%) more than echocardiography (57%). In the fast speed procedure, subjects were strongly agreed in ES Teck (71%) more than echocardiography (48%). Last procedure on simplicity, subjects were strongly agreed in ES Teck (69%) more than echocardiography (55%).

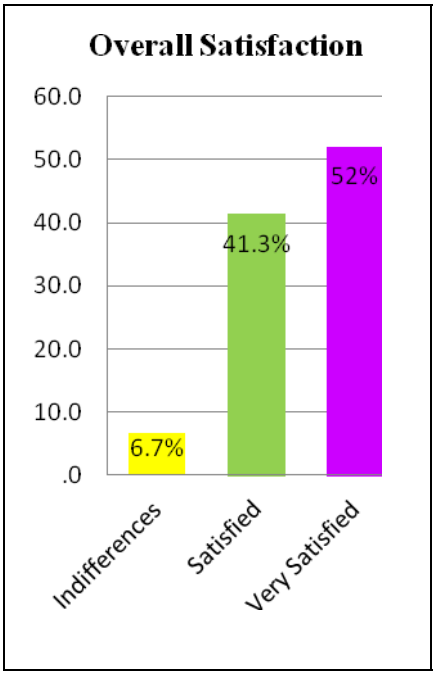

Figure 2 Overall Satisfaction of ES Teck

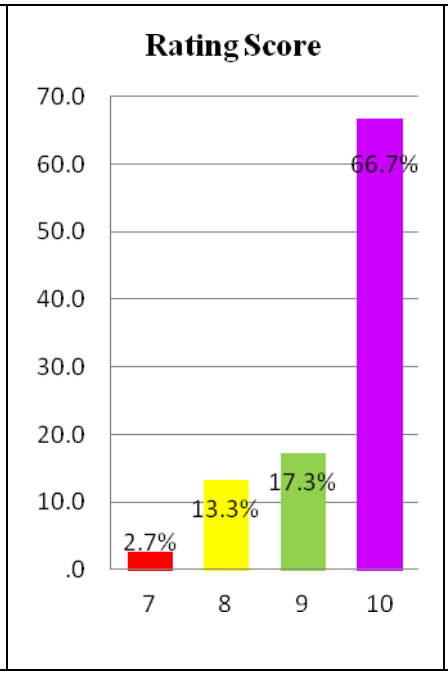

Figure 3 Rating Score of ES Teck

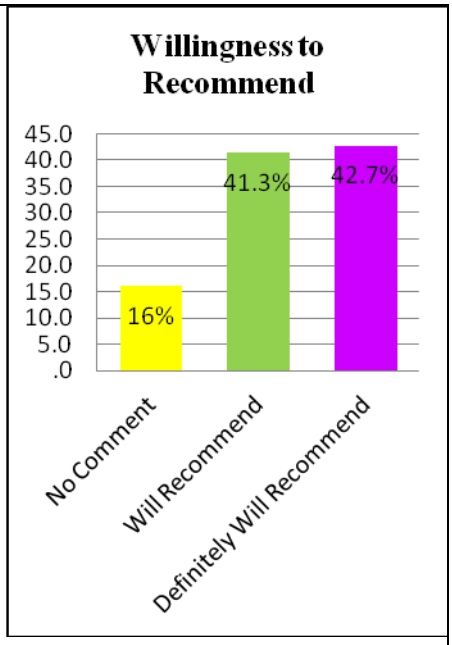

Figure 4 Willingness to Recommend ES Teck

The second part of self assessment data was the evaluation on overall satisfaction of ES Teck. The result of overall satisfaction on ES Teck, mostly were very satisfied for 52%, satisfied for 41.3% and indifferences for 6.7% as shown in figure 2. Rating score by subjects were range from 1 to 10, 66.7% scored for 10, 17.3% scored for 9, 13.3% scored for 8 and 2.7% scored for 7 as shown in figure 3. In the willingness to recommend ES Teck by subjects, percentage were 42.7% for definitely will recommend, 41.3% for will recommend and 16% for no comment as shown in figure 4.

Discussion

It was found from this study that ejection fraction percentage (%EF) between ES Teck and echocardiography were significantly correlated. It was very significant correlated in normal value of %EF. Although the abnormal value of %EF result was not significant correlated at $P<0.05$, the value objtained of $p = 0.095$ demonstrated possibility towards correlation at the confidence level of 90% ($P<0.1$). This research determined that ES Teck had an equal accuracy and precision when compared to echocardiography. It also considered that once ES Teck show the normal %EF, the result seem to be normal in echocardiography. On the other hand, once ES Teck show abnormal %EF, the physician must practically re-confirm with the standard medical device by echocardiography.

From the satisfaction assessment, subjects strongly agreed in the procedure of comfortability, speed and simplicity in ES Teck more than echocardiography. Majority were very satisfied to ES Teck. 66.7% of subjects were given a full score of 10 to ES Teck. Subjects about 84% were highly recommended ES Teck to others.

Recently, many researcher reviewed the comparison of ES Teck with various objectives. There was one studied done by Wasichaya Khanla (2011) to compare ES Teck with HOMA (serum) in insulin resistance subjects. The results showed an accuracy of ES Teck as compared with HOMA (serum) (DM type II patient = 92.86%, p=.712 with controlled group = 93.55%, p=.309). Another research done by Sumit Techasouksant (2011) was to compare blood test for thyroid hormone with ES Teck in normal subject. The result showed the significant correlations between ES Teck with serum thyroid stimulating hormone (TSH) (p=0.007). ES Teck had the highly sensitivity of 100% with 88% specificity. Last research of ES Teck compared with serum DHEAs in healthy volunteers done by Patchamol Masakul (2011) also showed the result of correlated with statistical significant ($p<0.001$).

Thus, the comparison of ES Teck with various objectives showed significantly correlation. Therefore, ES Teck was another choice of medical instrument to screen the heart condition.

Conclusion

ES Teck was a medical device that could give an accurate %EF as compared with echocardiography. It had a very strong reliable in the normal range of %EF. Therefore, ES Teck was a beneficial device to determine the heart failure by the screening of %EF. This device was favored in all gender for Thai and Arabs on comfortability, speed and simplicity to each step of examination. ES Teck concluded to be the pre-screening device to evaluate the heart condition before the patients face the symptoms of heart diseases accordingly. Also, ES Teck can be used as a guideline to assist the physician in selecting the proper management for the patient.

Recommendation of Future Study

This research has less subject for Thai as compare with Arabs. In the future study, it would be more beneficial to recruit more Thai patient in expectation of seek out the hidden abnormality prior the patient complain about their heart symptoms.

%EF could be compare to the separate group of degenerative disease like hypertension, diabetes and hyperlipidemia to look for correlation of %EF in ES Teck and echocardiography.

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