**Research Report**

# The use of elastic stocking to reduce the risk of varicose vein

## (*Penggunaan kaus kaki elastis untuk mengurangi risiko terjadinya varikosis)*

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## Abstract

***Objective***: To reduce the risk of varicoses in primigravida by wearing elastic stockings with mechanical compression.

***Method***: A prospective study was performed in a randomized single blinded trial with analysis of variance and repeated measures. The study was done at The Obstetrics and Gynecology Department Immanuel Hospital Bandung, with subjects obtained from the Obstetrics outpatient clinic during the period of May 2008 to March 2009. This study consisted of a population of 66 primigravidas randomly allocated in to 2 groups, 34 women in control group and 32 women in study group. Women in the study group were instructed to wear elastic stockings, while the control group was not. Measurements of veins dilatation were carried out using a Color Duplex Ultrasound.

***Results***: The 12 week examination didn't show any significant change on left femoral veins diameters in both groups. Examination at 34 weeks gestational age showed significant changes on left femoral veins in study group and control group (subsequently 0,83 ± 0,07 cm and 1,02 ± 0,35 cm). It also happened on examination at 2 weeks post-partum. The incidence of reflux was found only in the study group at sapheno-femoral junction in 6 of 34 women.

***Conclusion***: Mechanical compression provide protective effect from the development of varicoses shown by the reduced incidence in developing reflux in blood flow in saphenous-femoral junction, in addition to minimal dilatation of the lower limbs and pelvic veins.

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***Keywords***: varicoses; pregnancy; endothelial injury; saphenous-femoral junction; reflux; mechanical compression

## *Abstrak*

***Tujuan****: Untuk mengurangi risiko terjadinya varikosis dalam kehamilan pada primigravida dengan pemakaian kaus kaki yang mempunyai efek kompresi mekanis.*

***Metode****: Studi prospektif dengan pengkajian intervensional/uji klinis secara acak tersamar tunggal (randomized single blinded trial) dengan metode sidik ragam dan pengukuran berulang (repeated measures). Penelitian dilakukan di Bagian Obstetri dan Ginekologi RS Immanuel Bandung, dengan subjek penelitian dari Poliklinik Hamil RS Immanuel selama periode Mei 2008 sampai dengan Maret 2009. Subjek penelitian berjumlah 66 orang dibagi secara acak menjadi dua kelompok yaitu 32 orang kelompok perlakuan dan 34 orang kelompok non-perlakuan. Kelompok perlakuan diharuskan memakai kaus kaki elastis sepanjang hari kecuali saat tidur dan mandi. USG dupleks dengan color Doppler digunakan untuk menentukan diameter dan refluks vena tungkai dan panggul.*

***Hasil****: Pada pengamatan 12 minggu, tidak didapatkan perbedaan bermakna pada ukuran diameter vena femoralis kiri antara kedua kelompok tersebut. Pada pengamatan kehamilan 34 minggu, mulai didapatkan perbedaan bermakna di kelompok perlakuan dan non-perlakuan (berturut-turut 0,83 ± 0,07 cm dan 1,02 ± 0,35 cm). Demikian pula pada 2 minggu pascasalin di kelompok perlakuan dan non-perlakuan (berturut-turut 0,90 ± 0,30 cm dan 1,30 ± 0,68). Kejadian refluks pada daerah saphenous-femoral junction hanya ditemukan pada 6 orang dari kelompok non-perlakuan.*

***Kesimpulan****: Efek kompresi mekanis mempunyai sifat protektif terhadap terjadinya varikosis dalam kehamilan dengan lebih minimalnya dilatasi vena dan lebih sedikitnya arus balik vena tungkai dan panggul pada kelompok perlakuan dibandingkan dengan kelompok non-perlakuan.*

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***Kata kunci****: varikosis; kehamilan; saphenous-femoral junction; refluks; kompresi mekanis*

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## INTRODUCTION

Women today consider aesthetics and comfort factor is very important. Varicose in pregnancy may interfere with the aesthetics and causing discomfort to deserve more attention in recent years.

Varicose is the veins (venous) under the skin that stretch because of the disruption in the blood vessel valve itself. Dam what happened to cause the veins to widen and swell.[1,2] Risk factors in women with varicose include familial/genetics, age, contraceptive drugs, a job that requires long standing, obesity, inactivity, and most importantly the history of pregnancy or been pregnant.[3]

Varicose in pregnancy is not included in the three main causes of Maternal Mortality Rate (MMR), but the symptoms can be caused by varicose can reduce productivity and quality of life of a woman. Varicose cause pain, interfere with the aesthetic/cosmetic, and any costs of vascular surgery. Varicose also predispose to the occurrence of deep vein thrombosis.[4]

In Indonesia there has been no research on the prevalence and complications varicose. There is a difference between the prevalence varicose white women

and colored (Asia) of 49% to 36% so there is the assumption that maternal mortality due to complications in Indonesia varicose lower than in western countries.[5]

In the first pregnancy, studies in Europe show that varicose prevalence is 30-35%. This figure shows the magnitude varicose possibility of subsequent pregnancy and after menopause.[6,7]

Basically, efforts to control disease in pregnancy related varicose stages:

1) The primary prevention is the efforts to prevent varicose in pregnancy by eliminating the risk factors or predisposing factors.
2) Secondary Prevention is the efforts to find abnormalities that do not show clinical symptoms, but there is function and structural abnormalities of venous leg and pelvic veins in pregnancy.
3) Tertiary prevention is the efforts to prevent the disease that have been accompanied by clinical symptoms to heal varicose in pregnancy so the are no complications which lead to maternal mortality such as leg swelling, venous ulcers, deep vein thrombosis and pulmonary embolism. These efforts can be done by mechanical compression or with drugs.[1,3,8]

Because primary prevention efforts almost impossible, for example, avoiding risk factors such as the first pregnancy or pregnant not at the ideal age, the effort shifted to the prevention so the disease does not occur, secondary prevention by looking at changes in the structure and function of the pelvic veins and venous limbs and then intervention so that the changes that have the potential to cause varicose occurrence can be prevented or reduced.

Effect of mechanical compression elastic stockings, especially for changes in large vein function and will improve the quality of life of patients such as reducing pain and swelling. Mechanical compression can reduce the diameter of the veins, improve venous valve function, reduce venous reflux, pain and swelling of the feet and reduce the accumulation of blood in deep vein by preventing the dilatation. Elastic stockings with pressure from 20 to 30 mmHg can reduce swelling, pain and sense of weight on the foot.[2,10]

The study was conducted to examine how and what efforts are necessary to reduce the risk of pregnancy varicose in the first pregnancy (primigravida).

## METHOD

The research is using interventional prospective study with randomized single blinded control trial with analysis of variance and repeated measure.

Devices used in this research:

– Medical General Electric Voluson 730 Expert Color Doppler Ultrasound System
– Hartman-Vitasan elastic stocking (made in Germany)

The diameter (structure) of femoral vein, saphena magna vein, poplitea vein, and left and right illiac vein was measured. The reflux (function) of veins descibed was observed in 12 weeks pregnancy, 34 weeks pregnancy, and 2 weeks post partum.

## RESEARCH

Sixty six cased were analized, divided into 32 people in study group (wear elastic stocking) and 34 people in control group (not wearing elastic stocking). We added 30 non-pregnant women as comparison.

## RESULT AND DISCUSSION

Table 1. Comparison of Characteristic of Subjects (age, body mass index) between three study groups

| Variable | Groups | | | Significance |
|---|---|---|---|---|
| | Study group (n=32) | Control group (n=34) | Non pregnant women (n=30) | |
| Age (year) | | | | |
| x (SD) | 25.0 (3.3) | 25.0 (3.7) | 25.7 (2.3) | F=0.501 |
| Range | 20-30 | 20-30 | 20-30 | *p*=0.685 |
| Body Mass Index (kg/m$^2$) | | | | |
| x (SD) | 22.7 (2.2) | 23.0 (1.7) | 22.6 (2.2) | F=0.399 |
| Range | 19.8-26 | 19.8-26 | 19.8-26 | *p*=0.672 |

Table 1 shows that from age and body mass index there is no significant difference between non pregnant women, study group, and control group in the first examination (12 weeks pregnancy). This shows that the spread of disturbing factors in three groups are quite homogen so the bias could be eliminated.

**Table 2.** Comparison of the diameter of lower limbs vein and pelvic vein in 12 weeks pregnancy

| Variable | Groups | | | $X^2_{K-W}$ | p value |
|---|---|---|---|---|---|
| | Study group (n=32) | Control group (n=34) | Non pregnant women (n=30) | | |
| Left Femoral vein | | | | 0.745 | 0.689 |
| x (SD) | 0.80 (0.07) | 0.81 (0.06) | 0.81 (0.07) | | |
| Median | 0.79 | 0.79 | 0.82 | | |
| Range | 0.64-0.92 | 0.64-0.92 | 0.64-0.92 | | |
| Right Femoral vein | | | | 5.10 | 0.078 |
| x (SD) | 0.79 (0.07) | 0.76 (0.07) | 0.81 (0.07) | | |
| Median | 0.78 | 0.76 | 0.80 | | |
| Range | 0.64-0.92 | 0.60-0.92 | 0.64-0.,92 | | |
| Left Safena magna vein | | | | 1.148 | 0.563 |
| x (SD) | 0.80 (0.07) | 0.81 (0.07) | 0.82 (0.07) | | |
| Median | 0.80 | 0.78 | 0.83 | | |
| Range | 0.64-0.93 | 0.64-0.95 | 0.64-0.92 | | |
| Right Safena magna vein | | | | 4.844 | 0.089 |
| x (SD) | 0.79 (0.07) | 0.77 (0.06) | 0.79 (0.07) | | |
| Median | 0.78 | 0.76 | 0.78 | | |
| Range | 0.64-0.92 | 0.65-0.93 | 0.64-0.92 | | |
| Left Poplitea vein | | | | 1.006 | 0.605 |
| x (SD) | 0.80 (0.07) | 0.80 (0.06) | 0.81 (0.07) | | |
| Median | 0.79 | 0.78 | 0.79 | | |
| Range | 0.62-0.92 | 0.64-0.92 | 0.62-0.94 | | |
| Right Poplitea vein | | | | 3.045 | 0.218 |
| x (SD) | 0.79 (0.07) | 0.77 (0.06) | 0.79 (0.07) | | |
| Median | 0.78 | 0.78 | 0.78 | | |
| Range | 0.64-0.92 | 0.60-0.92 | 0.64-0.92 | | |
| Left External iliac vein | | | | 0.197 | 0.906 |
| x (SD) | 0.80 (0.07) | 0.80 (0.07) | 0.80 (0.07) | | |
| Median | 0.79 | 0.79 | 0.79 | | |
| Range | 0.64-0.92 | 0.64-0.92 | 0.64-0.93 | | |
| Right External iliac vein | | | | 4.744 | 0.093 |
| x (SD) | 0.79 (0.07) | 0.80 (0.07) | 0.80 (0.07) | | |
| Median | 0.78 | 0.76 | 0.78 | | |
| Range | 0.64-0.92 | 0.60-0.92 | 0.63-0.92 | | |

Table 2 shows that there is no significant difference in the diameter of pelvic vein and lower limbs vein between three groups in 12 weeks pregnancy (first examination).

Examination with venography in the third trimester of pregnancy shows the constriction of inferior caval vein.(11) The blood velocity in the femoral vein reduce progressively as the enlargement of uterus volume until 50% in the last trimester of pregnancy.(12) Venous insufficiency in pregnancy not only influenced by the size of uterus but also the hormonal factor as the increasing level of estrogen and progesterone during pregnancy. Which effect the pressure of the vein.(1,13,14) Increasing level of progesterone cause decreasing tone of smooth muscle and venous wall, decreasing excitability and electric activity, and increasing vein dilatation until 150%. This dilatation is back to normal after 8-12 weeks post partum.(10)

**Table 3.** Comparison of the Right and Left Femoral Vein Diameter between Study Group and Control Group

| Femoral Vein | Observation | Groups | | $Z_{M-W}$ | *p* value |
|---|---|---|---|---|---|
| | | Study group (n=32) | Control group (n=34) | | |
| Left | I | | | 0.161 | 0.872 |
| | x (SD) | 0.80 (0.07) | 0.81 (0.07) | | |
| | Median | 0.79 | 0.79 | | |
| | Range | 0.64-0.92 | 0.64-0.92 | | |
| | II | | | 3.477 | <0.001 |
| | x (SD) | 0.83 (0.07) | 1.02 (0.35) | | |
| | Median | 0.82 | 0.89 | | |
| | Range | 0.69-1.0 | 0.78-1.95 | | |
| | III | | | 5.276 | <0.001 |
| | x (SD) | 0.90 (0.30) | 1.30 (0.68) | | |
| | Median | 0.82 | 1.00 | | |
| | Range | 0.5-1.91 | 0.85-3.03 | | |
| Right | I | | | 1.757 | 0.079 |
| | x (SD) | 0.79 (0.,07) | 0,76 (0.07) | | |
| | Median | 0.78 | 0.76 | | |
| | Range | 0.64-0.92 | 0.60-0.92 | | |
| | II | | | 3.163 | 0.002 |
| | x (SD) | 0.84 (0.09) | 0.88 (0.05) | | |
| | Median | 0.82 | 0.89 | | |
| | Range | 0.72-1.23 | 0.78-0.99 | | |
| | III | | | 5.060 | <0.001 |
| | x (SD) | 0.88 (0.26) | 0.99 (0.11) | | |
| | Median | 0.82 | 0.98 | | |
| | Range | 0.69-1.71 | 0.85-1.52 | | |

*Note: The measurement of vein diameter in centimeter*
*$Z_{M-W}$ = Mann-Whitney Test*
*First Examination: 12 weeks pregnancy*
*Second Examination: 34 weeks pregnancy*
*Third Examination: 2 weeks post partum*
*The average diameter of femoral vein in non pregnant women: Left 0.81(0.07) cm and Right 0.81(0.07) cm*

Table 3 shows that there is no significant difference in left femoral vein diameter between two groups in 12 weeks pregnancy examination, but in 34 weeks pregnancy examination, there is a statistically significant difference ($p < 0,001$), as well as the examination in 2 weeks post partum ($p < 0,001$).

The change of left and right femoral vein diameter between study grouo and control group were showed in 34 weeks pregnancy and 2 weeks post partum examination which is statistically significant, where the diameter of femoral vein in control group is larger than in study group.

The increasing blood volume, especially the pasma component started in 12 weeks pregnancy, then increasing drastically from 24 weeks pregnancy and the peak is on 34 weeks pregnancy.(10)

The compression mechanism of gravid uterus shows clearly in the last semester of pregnancy. The enlarged uterus compress large vein in pelvic area and increase the pressure of the vein in lower limb. Superficial vein do not have supporting tissue, so the high pressure cause these vein to dilate easily and without the correct management, this condition leads to varicose.(1,10)

The examples of measuring the diameter of the veins and reflux with duplex ultrasound.

***Control group***


***Study group***

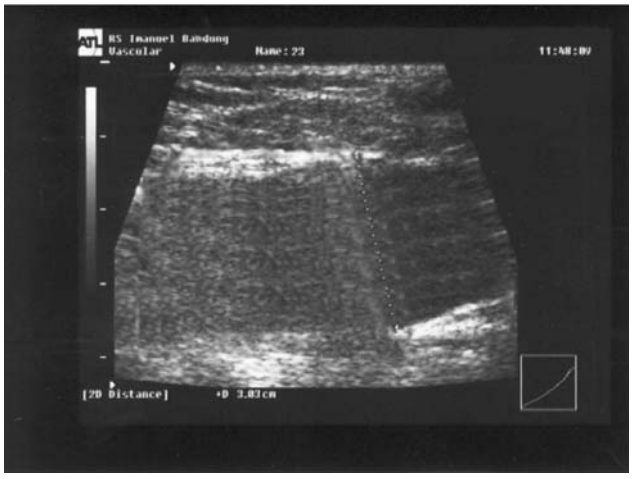

Left femoral vein appeared on observations 12 weeks of gestation, the measurement of diameter of 0.91 cm in the control group, and 0.88 cm in diameter in the study group.

***Control group***

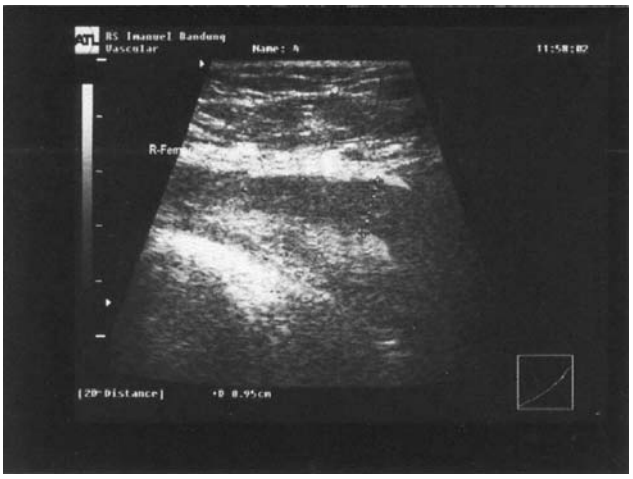

***Study group***


Left femoral vein appeared on observations 34 weeks of gestation, the measurement of diameter of 1.94 cm in control group, while the study groups diameter 0.92 cm.

***Control group***




***Study group***




The left femoral vein appeared at 2 weeks of observation post partum, measuring 3.03 cm in diameter in the control group, and in the study group in diameter 0.95 cm.

Reflux picture appear > 2 seconds left in the saphenofemoral junction obtained in the control group.

## CONCLUSION AND SUGGESTION

In this study obtained results that the primigravida group who did not use a mechanical compression, the vein diameter enlargement on average larger and also found the existence of reflux.

Mild varicose that stay at two-week post partum is only available on control group. Important role in the pathogenesis of varicose are the dilated veins of the legs and hips and use of mechanical compression can reduces venous dilatation of the pelvis and legs so that the risk of varicose also be reduced and the prognosis is better.

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