

# Pregnancy and lower limb varicose veins: prevalence and risk factors

## *Gestação e varizes de membros inferiores: prevalência e fatores de risco*

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### Abstract

**Background:** During and after pregnancy, lower limb varicose disease presents specific features that have influenced the conduction of studies designed to provide a better understanding of the condition. Such features include the appearance of lower limb varicose veins, their early development and intensity, and their rapid regression after delivery.

**Objective:** To assess the prevalence of lower limb varicose disease during pregnancy and to identify the main associated risk factors. Prevalence of varicose disease during pregnancy is high, affecting almost 70% of pregnant women considering all types of varicose disease. This high prevalence is mainly caused by the increase in the estrogen and progesterone levels during pregnancy.

**Material and method:** We analyzed 352 pregnant women during prenatal follow-up. The subjects were randomly selected during a 14-month period. Varicose disease was clinically identified and classified according to Widmer's criteria: trunk varicose veins, reticular varicose veins, and telangiectasias; being reclassified according to the criteria of the CEAP clinical classification. The results of prevalence and risk factors were statistically analyzed using univariate and multivariate analyses.

**Results:** Considering all types of varicose veins, prevalence of varicose disease was 72.7% (256 pregnant women). Only 27.3% (96) of pregnant women did not have varicose disease (C0), and this group was considered the control group. After multivariate analysis, the main risk factors were: family history and pregnant women's age.

**Conclusion:** The high prevalence of varicose disease and the associated risk factors suggest the need of providing the health professionals involved in women's health care, especially during the fertile period, with information on this disease.

**Keywords:** Pregnancy, varicose veins, epidemiology, veins.

### Resumo

**Contexto:** Durante e após a gestação, as varizes dos membros inferiores têm aspectos peculiares, tais como o seu aparecimento, a precocidade de seu desenvolvimento, a intensidade e, no puerpério, a rapidez com que regredem. Esses aspectos têm influenciado os estudos para a compreensão dessa patologia.

**Objetivo:** Verificar a prevalência das varizes dos membros inferiores em gestantes e os fatores de risco mais relevantes envolvidos. A prevalência na gestação é alta, atingindo cerca de 70%, quando se consideram todos os tipos de varizes. Essa alta prevalência decorre principalmente do aumento nas taxas dos estrógenos e progestágenos que ocorre durante a gravidez.

**Material e método:** Foram avaliadas 352 gestantes no período pré-natal, durante 14 meses, escolhidas ao acaso. A doença varicosa foi diagnosticada clinicamente e classificada segundo os critérios de Widmer em varizes tronculares, reticulares e telangiectasias e reclassificadas pela classificação CEAP, segundo o critério clínico. Os resultados de prevalência e fatores de risco foram submetidos às análises univariada e multivariada.

**Resultados:** A prevalência da doença varicosa, quando considerados todos os tipos de varizes, foi de 72,7% (256 gestantes). As 96 gestantes (27,3%) que não apresentaram doença varicosa foram consideradas, para análise estatística, como controle. Os fatores de risco de significância, após análise multivariada, foram: antecedente familiar positivo e idade.

**Conclusão:** A prevalência da doença varicosa durante a gestação e os fatores de risco envolvidos indicam a necessidade de divulgação dessa patologia entre os profissionais envolvidos na prevenção e manutenção da saúde da mulher, especialmente aquelas em período fértil.

**Palavras-chave:** Varizes, gestação, epidemiologia, veias varicosas.

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**Introduction**

Lower limbs varicose disease in pregnant women for decades have been drawing researchers’ attention. The appearance of varicose veins during pregnancy and its precocity, the intensity of its development, the uncommon symptoms and mainly the rapidity of regression after puerperium are peculiar aspects to lower limbs varicose disease during pregnancy which influence the development of studies about the subject. The reversibility of this disease is the most typical phenomenon; they may decrease or vanish after delivery. Around half of the world population carries lower limbs varicose disease, affecting 50-55% of women and 40-50% of men if minor forms of varicose disease (reticular varicose veins and telangiectasias) are considered. Considering larger and more visible varicose veins, the di-

sease affects less than 1/4 of the population, assailing 2-25% of women and 10-15% of men.<sup>1</sup>

Researchers have been observing the correlation between pregnancy and varicose disease for a long time. The appearance of venous dilatations in lower limbs or in breasts of women in reproductive age is considered a sign of pregnancy, and some women attribute the appearance of varicose veins to pregnancy and its worsening to successive pregnancies.<sup>2</sup>

According to the literature (Table 1), the prevalence of varicose veins during pregnancy varies widely, due the use of diverse concepts, classifications and even the type of epidemiological analysis performed, in addition to regional and racial differences. Many studies on this subject present only an estimative of the prevalence of varicose disease during pregnancy (Table 1). This estimative varies from 20 to 50% of pregnant women and, when all the types of varicose veins are included, e.g. telangiectasias, the number may reach 70%.

We have found no epidemiological studies on varicose disease during pregnancy in Brazil, and many authors simply repeat prevalence data presented in previous publications when addressing the subject.

**Material and method**

Aiming at assessing the prevalence of varicose disease during pregnancy we have conducted this study with

**Table 1** - Prevalence of varicose disease during pregnancy, according to the authors

Authors	Year	Prevalence (%)	Type of varicose disease
Bassi <sup>3</sup>	1967	10*	trunk varicose veins
Boivin & Hutinel <sup>4</sup>	1987	30-40*	trunk varicose veins
Griton et al. <sup>5</sup>	1987	63	all types
Valdevenito et al. <sup>6</sup>	1989	14.4	trunk varicose veins
Barile et al. <sup>7</sup>	1990	50-60*	all types
Dindelli et al. <sup>8</sup>	1990	57.9	all types
Sciannameo et al. <sup>9</sup>	1993	50-60*	all types

\*data presented as estimative by the authors.



**Figure 1** - Varicose veins (CEAP C2)



**Figure 2** - Reticular veins (CEAP C1)

352 pregnant women, randomly selected, at the Pre-Natal Assistance Program of the Escola Paulista de Medicina, UNIFESP, in 1994. For evaluation the CEAP criterion was used,<sup>10</sup> which classifies varicose disease in: a) varicose veins – dilated subcutaneous vein with 3 mm or more of diameter, in supine position, possibly involving saphenous veins, its tributaries, or non saphenous superficial veins (Figure 1); b) reticular veins – dilated subdermic vein, 1-3 mm of diameter and tortuous (Figure 2); c) telangiectasias – confluent intradermic venulae with less than 1 mm of diameter (Figure 3). Patients without visible or palpable signs of varicose disease were considered as CEAP C0, which formed the control group for statistical analysis.

**Results**

A high prevalence of varicose disease was observed in this sample in comparing data for presence and absence of varicose disease (Table 2).

In studying the 256 (72.7%) pregnant women carrying varicose disease, we observed that 72 (20.5%) presented varicose veins (CEAP C2) and 184 (52.2%) presented reticular veins and/or telangiectasias (CEAP C1). Ninety-six women from the sample (27.3%) did not present any type or varicosities (CEAP C0) (Table 3).

The prevalence of vulvar varicose veins in 14 pregnant women was also observed (4%) (Figure 4). We have noted that in all the cases there was an association with lower limbs varicose disease, and in 12 patients (85.7%) this association was with severer forms (varicose veins) and in two (14.3%) the association was with reticular veins and telangiectasias.

Multivariate analysis of risk factors revealed that age, number of pregnancies and positive family history for varicose disease were associated with the presence of the disease. In multivariate analysis only two risk factors, age over 22 years and positive family history, were significant for varicose veins disease (CEAP C2) with odds ratio above 1. After this analysis, the number of pregnancies was no longer considered a significant risk factor, although it characterized an association trend (Table 4).

**Discussion**

Varicose veins are classified in two groups, according to their etiology: primary (essential) and secondary (post-thrombotic, due to congenital or acquired arteriovenous fistulae). Etiopathogeny of primary varicose veins is still controversial, multiple and present unknown etiopathogenic



Figure 3 - Telangiectasias (CEAP C1)

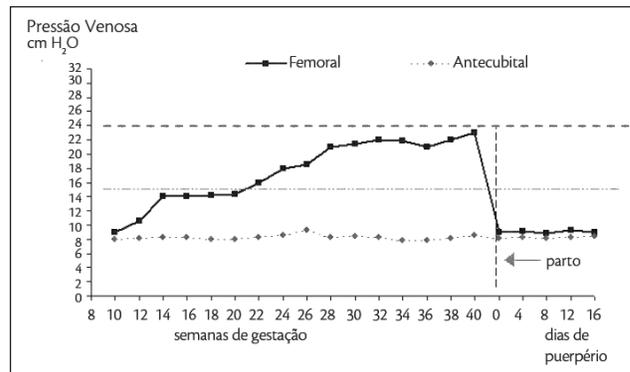


Figure 4 - Circulatory effects of supine position, assessed through measuring venous pressure in femoral vein and antecubital vein in pregnant women, according to weeks of pregnancy and days of puerperium<sup>16</sup>

Table 2 – Prevalence of varicose disease in the 352 patients studied

Varicose disease	Number of patients	%
CEAP C1 e C2	256	72.7
CEAP C0	96	27.3
Total	352	100.0

Table 3 - Prevalence of varicose disease according to types of varicose veins

CEAP Classification of varicose veins	N	%
C2	72	20.5
C1	184	52.2
C0	96	27.3
Total	352	100.0

**Table 4** - Logistic regression multivariate analysis for risk factors of lower limbs trunk varicose veins in the 352 patients

Characteristic	Coefficient	Standard error	Odds ratio	CI = 95%	
				Inferior L.	Superior L.
Age ( 22 vs. 22 years)	1.219	0.360	3.38*	1.66	6.88
AF (yes vs. no)	1.270	0.350	3.56*	1.78	7.12
Pregnancies (1 vs. 1)	0.492	0.390	1.64	0.76	3.53

FH = family history.

\* statistic significance.

factors. In general population, the following etiopathogenic factors are highlighted: family predisposition, sex, age, number of pregnancies, endocrine alterations, obesity, pregnancy, habits and profession, congenital valve alterations and others. Nevertheless, several theories try to explain the appearance or worsening of varicose disease during pregnancy. Those theories are exposed below.

- a) Mechanical theory – the oldest and the most widely known. Lower limbs varicose disease would be caused by mechanic compression exerted by the pregnant uterus on pelvic and iliac veins. Nowadays this mechanical concept was abandoned, because clinical evidence has shown that venous dilatations begin their development in the first weeks of pregnancy, when the increase in uterine volume is still insignificant. In case of fetal death, venous dilatation rapidly and linearly recede, even before fetal expulsion; in twin pregnancies, the development of varicose veins is big, but not as expected; venous dilatations are not limited to tributary veins of the inferior vena cava, observable in the arm, abdominal flank and breasts; uterine tumors of a similar or even higher volume than that of the pregnant uterus do not provoke the formation of varicose veins, neither an increase in pre-existing varicose veins' intensity. There is evidence, however, of mechanic compression of the uterus on the iliac veins and inferior vena cava, especially in the last trimester of pregnancy.<sup>11,12</sup> These compressions may possibly explain the etiopathogeny of vulvar varicose veins that frequently emerge in this period of pregnancy, as we could observe in this series. Through a duplex scanning, phlebography and even computed tomography, it was demonstrated that the speed of blood flow in femoral veins progressively decreases, proportionally to the increase of the uterine volume, until diminishing in 50% in the third trimester. In some cases, the uterus completely occludes the inferior vena cava with the patient in dorsal or right lateral decubitus.<sup>13</sup>
- b) Hormonal theory – currently, the most widely accepted.<sup>14,15</sup> The most important piece of evidence supporting the hormonal theory in varicose veins development

was obtained in 1943 by McLennam.<sup>16</sup> This author has compared the measures of antecubital and femoral venous pressure in pregnant women in dorsal decubitus and observed a progressive increase in femoral pressures, while antecubital venous pressures remained unchanged even in the initial stages of pregnancy, when the uterine volume was small and could lead to compression of the inferior vena cava or even of the iliac veins (Figure 4). These alterations in venous pressure would be caused by hormonal increase, both estrogenic and progestogenic. Indeed in the secretory phase of the menstrual cycle, progesterone rises from 30 mg/24h to 75 mg/24 h in the 20th week of pregnancy and peaks 250 mg/24h in the end of pregnancy, representing an 8 times increment. Estrogens also suffer a great increase, rising from 0.02 µg/24 in the proliferative phase of the menstrual cycle to 5.0 µg/24 h at the end of pregnancy, representing an increase of up to 250 times.<sup>16</sup> Progesterone increase results in hypotonia of smooth muscle fibers and myocells (joint muscle framework of the venous wall), reducing excitability, electric activity and increasing venous distensibility, which reaches up to 150%, returning to normal values in 8 to 12 weeks after delivery.<sup>17</sup> On its turn, estrogenic secretion causes an increase in arterial flow in uterus and pelvis, and this increment in the venous return flow toward hypogastric venous system would cause a functional obstacle in external iliac veins, transmitted to lower limbs veins. The classical theory of Piulachs et al.<sup>18</sup> claimed that the increase in progesterone and hypophysary hormones would result in a massive opening of arteriovenous anastomoses, causing venous hypertension in the lower limbs. Some facts support this theory, because there is an atypical distribution of varicose veins in the lower limbs, 'hyperoxygenation' of venous blood and rapid contrastation of the venous network during arteriographies.<sup>19,20</sup> On the other hand, this theory would not explain the appearance of varicose veins in only one side, a fact routinely observed in clinical practice. More recently, Boivin et al.<sup>21</sup> have shown, through duplex scanning, the diameter's increase in competent

and incompetent veins, comparing the values in the first and third semesters of pregnancy and the decrease of these values after birth. When the diameters observed in the first trimester and in puerperium were compared, no statistic difference was found, which shows that the veins had returned to initial values.

- c) Increase in pelvic circulation – in pregnancy, there is an increase in uterine blood debit (500 ml/min of total blood flow<sup>22</sup>), resulting in an addition to pelvic venous pressure and venous engorgement of iliac veins and reduction in draining capacity of lower extremities' collecting veins.
- d) Hereditary predisposition – for most authors it is a necessary and indispensable condition for varicose disease development,<sup>8,12,14,23</sup> an issue disputed by some authors. Ludwig,<sup>24</sup> for instance, did not find positive family history in 56% of varicose patients, and Bertone et al.<sup>25</sup> found only 35% positivity in 700 cases investigated. Nevertheless, in a careful study, Cornu-Thenard et al.<sup>26</sup> evaluated 134 patients – 67 with varicose disease and 67 normal – and their parents, concluding that family factor is of great importance in the genesis of varicose disease.
- e) Increase in volemia – blood volume during pregnancy is increased in more than 30%; this occurs mainly due to plasma activity.<sup>27</sup>
- f) Mesodermic deficiency – Arruda<sup>14</sup> considers that congenital mesodermic deficiency is an important factor in etiopathogeny of essential varicose disease. The expression of this deficiency would be the association, in the same patient, of lower limbs varicose veins with inguinal or muscle hernias, cutaneous stretch marks and flat feet, relatively common.
- g) Structural alterations of the venous wall – there is a reduction of smooth muscle fibers of the venous wall and qualitative and quantitative alterations of the joint tissue in the wall of the varicose vein. Fibers are deformed and immersed in joint tissue, with collagen, reduced and disorderly disposed, with an excess of 'proteoglycans'. In addition, there is an increase in all the activities of lysosomal enzymes (hyaluronidases, glucosaminidases, and phosphatases).<sup>9</sup> According to Silveira,<sup>28</sup> in our milieu varicose saphenous vein presents significant structural modifications in its wall, occurring, in addition to a greater intimal thickening, deep modifications in the structure of the tunica media, with interposition of elastic fibers to smooth muscle clusters, consequently altering the resistance of the damaged venous wall.

- h) Venous valve anatomic alterations – through agenesis or hypoplasia of the iliac-femoral valve, which supports the hydrostatic pressure of a blood column from the heart to the inguinal region. In 8% of the persons, this valve is not present bilaterally, and in 30% it is present only in one of the sides.<sup>29</sup> Barile et al.<sup>7</sup> referred that this valve is ineffective in 64% of varicose disease carriers. Agenesis or incompetence of these valves would occasion an increase in hydrostatic pressure of the saphenous-femoral ostium and consequent reflux in the superficial system.

### Risk factors

The most important risk factors for the development of varicose disease during pregnancy are:

- 1) Age – most authors agree that age is one of the main risk factors<sup>1,9,11,23,26,29</sup>. Widmer,<sup>30</sup> in his Basle Study III, observed that age is the most important risk factor, with a 6-10 times higher prevalence in 70-year-old persons than in 30-year-old persons. Maffei<sup>23</sup> also observed an increase in prevalence of varicose disease and chronic venous insufficiency with age, reaching 78.2% of examined women older than 70 years. During pregnancy, there is a predominance of trunk varicose veins in age groups between 21 and 40 years old.<sup>31</sup> In our study we have observed that 65% of the 352 patients were between 20 and 29 years old, predominantly 20-24 (41.2%). When we performed the multivariate analysis, odds ratio was 3.38 times higher in the occurrence of trunk varicose veins in 23-year-old patients than in those who were 22 or younger (Table 4).
- 2) Number of pregnancies – another important risk factor in the development of varicose disease in women is pregnancy.<sup>3,15,20,23,30,32-34</sup> Basellini et al.<sup>35</sup> have observed a higher prevalence of varicose disease in patients who had undergone more than one pregnancy in comparison to nulliparae, in a 1:5 proportion, but have not observed a higher incidence with the increase in the number of pregnancies. Boivin & Hutinel<sup>4</sup> have referred that the prevalence of varicose veins in men and women could be classified in two different orders: between men and nulliparae a proportion of 1:1.2 was found, whereas between men and multiparae, it is 1:4.6. Dindelli et al.<sup>36</sup>, in a series of 611 women, have observed a risk 3.8 times higher of varicose disease development in secundiparae or more in relation to nulliparae and 1.2 times higher in primiparae in relation to nulliparae. In our study, we have observed that univariate

analysis and prevalence of pregnant women with trunk varicose veins was significantly higher in secundigestae. In performing a multivariate analysis, with age correction, this factor became non-significant, revealing that the age factor was more important than the number of pregnancies in the prevalence of trunk varicose veins (Table 4). These corrections and adjustments had already been highlighted by some authors that did not obtain significance after age adjustments.<sup>32,33</sup> The mean number of pregnancies in this casuistic (2.4 per patient) was lower than in other series, and this may have influenced the results. Maffei,<sup>23</sup> in his study, indicates that there was a positive correlation between the prevalence of varicose veins and number of pregnancies, even with age adjustment. Of 68 women with varicose disease, 66 (9.9%) were nulligestae, 44 (6.6%) were primigestae, 76 (11.4%) were secundigestae, and the other 482 (72.2%) had three or more pregnancies.

- 3) Family history – the importance of heredity in varicose disease prevalence still presents some controversial opinions, because some factors may influence heredity analysis. Varicose disease is very frequent in the population, causing a high family positivity. Moreover, it is easier for persons carrying varicosities to remember relatives who have the disease than for those who do not carry it.<sup>1</sup> While some authors have affirmed they had not observed any influence of heredity in varicose disease prevalence,<sup>11,36,37</sup> others have found a higher prevalence of varicose disease in persons with positive family history.<sup>5,10,24,38</sup> Dindelli et al.<sup>36</sup> have found a relative risk 6.2 times higher of venous disease in pregnant women with positive family history than in those who did not have a family history of the disease. In this study, only first-degree relatives were considered, and the relation between venous disease and family history remained consistent, even after age adjustment. In a careful study evaluating men and women between 30 and 40 years old and their parents through physical exam, Cornu-Thenard et al.<sup>26</sup> have reported that the risk of developing varicose veins was 90% when both parents presented the disease and 25% for males and 62% for females when only one of the parents was affected. In patients whose parents did not present varicose veins, the risk of developing this disease reached 20%. In our study, in comparing pregnant women carrying varicose disease with positive family history with those who had no family history, we observed a significantly higher prevalence of pregnant women with varicose disease and family history, with an odds ratio 2.48 higher than

those with the disease but no family history. In multivariate analysis for trunk varicose veins, we observed that the family history was the most important factor; pregnant women with family history of the disease have 3.56 times more chances of acquiring it than those who do not have it.

## Conclusion

The high prevalence of varicose disease during pregnancy, etiopathogeny and risk factors involved (mainly age and family history) in the development of this disease indicate the necessity of using effective prophylactic measures that should be indicated since the beginning of pregnancy and since the first pregnancy, thus promoting the maintenance of the pregnant woman's health and, consequently, of the newborn.

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