also thank Dr. J. E. Cradock-Watson (senior bacteriologist, Public Health Laboratory, Manchester), Mr. J. B. Jones (consultant obstetrician and gynaecologist, University Hospital of South Manchester), and the maternity ward sisters for their co-operation. Dr. F. T. Perkins (Medical Research Council Laboratories, Hampstead) kindly supplied the vaccines used. During part of this study one of us (H.M.) was in receipt of a grant from the Medical Research Council.

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Incidence of Idiopathic Venous Thromboembolism in Nurses

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British Medical Journal, 1973, 4, 446-448

Summary

The incidence of idiopathic deep vein thrombosis and pulmonary embolism in a group of nurses (9.4 per 1,000 per year and 7.5 per 1,000 per year respectively) was much higher than the reported incidence in women of childbearing age in the general population (0.65 per 1,000 per year and 0.11 per 1,000 per year respectively). We suggest that these results show that nurses face an increased risk of idiopathic thromboembolism as a result of their occupation.

Introduction

Idiopathic venous thromboembolism is defined as that not associated with medical, surgical, or obstetric conditions, occurring in active, ambulant people without apparent cause (Hume *et al.*, 1970). Factors relevant in causation include ABO blood group (Jick *et al.*, 1969), body weight (Vessey and Doll, 1969), use of oral contraceptives containing oestrogen (McQueen, 1971), and possibly cigarette smoking (Frederiksen and Ravenholt, 1970; Sartwell *et al.*, 1969). Unusual physical effort has been implicated (Feinleib, 1972), but we have found no reference in the literature to occupational factors before the study of Sartwell *et al.* (1969) which found a high proportion of cases of idiopathic venous thromboembolism in a retrospective study to be nurses.

In a retrospective study of idiopathic venous thromboembolism in women of childbearing age we also noted that a proportion of cases were nurses, and have calculated the incidence of the disease in a defined population of nurses.

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Materials and Methods

BACKGROUND

The initial aim of the study was to assess by a retrospective case-control method the effect of the advice from the Committee of Safety of Drugs (1970) that oral contraceptives containing more than 50 µg of oestrogen should not be prescribed. We attempted to identify all cases of idiopathic venous thromboembolism in women aged from 15 to 45 years diagnosed at this hospital between 1 January 1971 and 30 June 1973. Cases found had all been inpatients in the female general medical ward of 27 beds of which, on average, 80% are occupied by civilian patients.

CASE FINDING

Pulmonary Embolism.—Women patients with perfusion defects on lung scan during the relevant period were identified from the records of the Department of Nuclear Medicine, and the case notes of all the patients within the age group 15-45 years were retrieved. It is improbable that any case of pulmonary embolism was diagnosed without the aid of lung perfusion scanning.

Deep Vein Thrombosis.—Cases were identified from the ward admission book.

DIAGNOSTIC CRITERIA

Pulmonary Embolism.—The following criteria had to be satisfied: (1) lung scan—interpreted in conjunction with a chest x-ray picture, showing perfusion defects compatible with pulmonary embolism; (2) the consultant in charge had reached a diagnosis of pulmonary embolism; (3) rescrutiny did not cast doubt on diagnosis.

Deep Vein Thrombosis.—The following clinical criteria were applied: (1) agreement among attending clinicians; (2) three or more of the following—calf pain, calf tenderness, temperature difference between limbs, one centimetre difference in diameter between calves, pitting oedema; and (3) absence of any other condition to account for such signs. These criteria should yield a very low incidence of false positive diagnosis (Hicks, 1972).

Superficial thrombophlebitis and thrombosis other than in leg veins were excluded.

CRITERIA FOR IDIOPATHIC VENOUS THROMBOEMBOLISM

This is a diagnosis of exclusion, and the following circumstances were considered to predispose to venous thromboembolism: (1) medical conditions—for example, malignancy, cardiovascular disease, arthropathies, inflammatory bowel disease; (2) surgical operation, childbirth, or major trauma within six weeks of the thromboembolic event; (3) bed rest or immobilization of longer than seven days within four weeks of the thromboembolic event; (4) infection, inflammation, or trauma of the same limb within two weeks of the thromboembolic event; (5) varicose veins.

These criteria are similar to those of Sartwell *et al.* (1969) but obesity and unusual strenuous activity could not be quantitated from the records, and were not regarded as predisposing factors. Cases with previous thromboembolism were included if the initial event occurred during the period of study, and the circumstances at onset were clearly documented.

DEFINED POPULATION OF NURSES

An accurate record of the number of nurses employed in this hospital was obtained from the regulating office.

Results

Twenty-one women aged from 15 to 45 years satisfied these criteria during the 30-month period. Seven were nurses (excluding a dental nurse, whose work differs substantially from that of a medical nurse). The nature of the thromboembolic episodes in the nurses are compared with other cases in table I, and factors of possible relevance to venous thromboembolism in the two groups are shown in table II. The nurses on average were younger, fewer were parous, there was little difference in body weight or smoking habits, and an equal proportion in each group was using an oral contraceptive containing oestrogen.

The occupations of the other 14 women were: housewife (five cases), Wren, dental nurse, shop manageress, shop assistant, office cleaner, schoolteacher, factory worker, waitress, and a viewer.

TABLE I—Nature of Thromboembolic Episode

	Nurses	Other Cases	Total
No. of Cases	7	14	21
D.V.T. alone	2 (28%)	6 (43%)	8 (38%)
P.E. alone	2 (28%)	6 (43%)	8 (38%)
D.V.T. and P.E. ..	3 (43%)	2 (14%)	5 (24%)
Total P.E.	5 (71%)	8 (57%)	13 (62%)

D.V.T. = Deep vein thrombosis. P.E. = Pulmonary embolism.

TABLE II—Factors of Possible Importance in Venous Thromboembolism

	Nurses	Other Cases	Total
No. of Cases	7	14	21
Average age in years ..	23.3	28.9	27
Average weight in lb (kg)	136 (62)	139 (63)	138 (63)
Parous	1 (14%)	6 (43%)	7 (33%)
No. of smokers	3 (43%)	6 (50%)*	9 (47%)*
No. using oral contra- ceptive	5 (71%)	10 (71%)	15 (71%)

*Data not available for two cases.

INCIDENCE OF IDIOPATHIC VENOUS THROMBOEMBOLISM IN NURSES

Five of the nurses had a thromboembolic episode while employed in this hospital during the period of study. One had deep

vein thrombosis alone, two had deep vein thrombosis with pulmonary embolism, and two had pulmonary embolism with no clinical evidence of venous thrombosis. During the time of study there were 530 "nurse-years" in nurses employed in the hospital, giving an incidence of idiopathic venous thromboembolism of 9.4 per 1,000 nurses per year (95% confidence limits 3.1-22.0). The incidence of pulmonary embolism was 7.5 per 1,000 nurses per year.

Discussion

In a retrospective case control study of the relation between oral contraceptives and thromboembolism Sartwell *et al.* (1969) included 118 cases of idiopathic venous thromboembolism in women of childbearing age, of whom 21 (17.8%) were student nurses and an unstated number were graduate and licensed practical nurses. They speculated that hospital jobs which involve staying on one's feet for long periods are conducive to venous thrombosis.

Published data on the incidence of venous thromboembolism in women of childbearing age are tabulated in tables III and IV. There are no figures for the incidence of idiopathic venous thromboembolism from general practice, and there is no previous study directly comparable to the present one, as the literature is not uniform in defining the term venous thromboembolism, in criteria for idiopathic cases, or even in the definition of childbearing age. Strict diagnostic criteria, particularly for deep vein thrombosis, have not been set out in any previous

TABLE III—Incidence of Venous Thromboembolism in Women of Childbearing Age, Including Cases with Predisposing Factors

Author	Type of Case Included	Source of Cases	Incidence (per 1,000 per year)
Drill and Calhoun (1968) (review) ..	Venous thromboembolism including superficial thrombophlebitis	General practice	2.2
"	"	Hospital admissions	0.9
Royal College of General Practitioners (1967)	Deep vein thrombosis and pulmonary embolism	General practice	0.34
"	Pulmonary embolism	"	0.11

TABLE IV—Incidence of Idiopathic Venous Thromboembolism in Women of Childbearing Age

Author	Type of Case Included	Source of Cases	Incidence (per 1,000 per year)
Burket, R. L., quoted by Drill (1972) ..	Venous thromboembolism including superficial thrombophlebitis	Hospital admissions	0.65
Vessey and Doll (1968)	Pulmonary embolism	"	0.11
	Deep vein thrombosis and pulmonary embolism, not using oral contraceptive	"	0.05
Vessey and Doll (1968)	First episodes of D.V.T. or pulmonary embolism using oral contraceptive	"	0.33
Present study ..	Deep vein thrombosis and pulmonary embolism	Nurses	9.4

study. Nevertheless, it is highly improbable that the magnitude of difference between the incidence in nurses and in women of childbearing age in general can be explained by different study designs. One might have expected 0.18 first episodes of idiopathic deep vein thrombosis or pulmonary embolism during this study if all the nurses were using an oral contraceptive (Vessey and Doll, 1968), or 0.18 cases, including those with predisposing factors, from the figures of the Royal College of General Practitioners (1967), compared with the five cases observed. The observed incidence of pulmonary embolism in

nurses (7.5/1,000/year) is over 60 times higher than that recorded in general practice (Royal College of General Practitioners, 1967) or calculated from hospital admissions (Burket, quoted by Drill, 1972). It seems that there is an increased incidence of idiopathic venous thromboembolism diagnosed in nurses.

Venous thromboembolism has become more common in recent years, even before widespread use of oral contraceptives (Morrell *et al.*, 1963; Loehry, 1966; Hume *et al.*, 1970), but there is no evidence to suggest that there has been an increase sufficient to account for the observed difference. Lay people may more readily tolerate symptoms of venous thromboembolism without seeking medical advice, and it is impossible to estimate the importance of this factor. The difficulties in diagnosing both deep vein thrombosis and pulmonary embolism are well known (Coon and Coller, 1959; Medd and McBrien, 1962; Hamilton and Thompson, 1963; Richards, 1966), and it may be that venous thromboembolism is recognized more readily in hospital nurses than in general practice. This is unlikely to apply to deep vein thrombosis in this study since doubtful cases were excluded by the criteria adopted. (In fact there were three cases of "doubtful" idiopathic deep vein thrombosis, treated with anti-coagulants, in the defined population of nurses during the period of study.) Pulmonary embolism without clinical evidence of leg vein thrombosis may be particularly difficult to diagnose, but such cases were not more frequent among the nurses (table I). In summary, the true incidence of idiopathic venous thromboembolism in women of childbearing age may be higher than previously recorded, but it is unlikely to be as high as that observed in nurses.

It is more probable that nurses have a real increased risk of developing idiopathic venous thromboembolism. The everyday clinical observation that symptoms and signs of deep vein thrombosis are aggravated in the erect position and relieved by recumbency might suggest that nurses, or other people who are on their feet for long periods, would be more likely to present with clear-cut symptoms and signs, but this could not account for the high incidence of pulmonary embolism.

The population of nurses studied were younger, and of lower parity, than women of childbearing age in the general population, both factors which would, if anything, tend to lower the

incidence of venous thromboembolism (Royal College of General Practitioners, 1967). There is no evidence that obesity, cigarette smoking, or the use of oral contraceptives played a part in the excess incidence in nurses (table II). The nurses studied were serving in the Queen Alexandra Royal Naval Nursing Service for which a high standard of fitness is required, but otherwise they do not differ from nurses in general, and in particular the training and nursing duties are similar to those in civilian practice.

This study supports the suggestion by Sartwell *et al.* (1969) that nursing may predispose to idiopathic venous thromboembolism, and suggests a need for further study of the part played by occupational factors in venous thrombosis.

We wish to thank Surgeon Captain P. J. Preston, Surgeon Commander A. M. Hazell, and Surgeon Commander J. F. Rivers, for allowing us to study patients under their care.

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