OBESITY AND ITS ASSOCIATION WITH THE COMPLICATIONS OF PREGNANCY

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Of recent years much attention has been given to the subject of obesity and in particular its relationship to pre-eclamptic toxæmia and essential hypertension. Williams (1957) showed that patients who started their pregnancies with a high initial weight were more likely to develop toxæmia of pregnancy, while Stewart and Hewitt (1960) confirmed these findings and went on to show that it occurred less often than average in those who were underweight. These latter findings were questioned later by Lowe (1961) on the ground that the diagnosis of pre-eclamptic toxæmia was based on blood-pressure readings alone and as a result probably included a number of cases of essential hypertension. As for essential hypertension, Leitner (1955) wrote that he considered obesity to be a conditioning factor in its production. Since then there has been a wide acceptance of the close connexion between obesity and essential hypertension.

In all probability it is the tendency to hypertension in the obese subject which predisposes to the toxæmia, and not the overweight itself, which is directly responsible for the increased incidence of toxæmia; for Browne and Dodds (1939) found a hypertensive tendency in most of their 114 cases of recurrent toxæmia and suggested that they were all potential hypertensives in whom the disease would become manifest in time.

In this survey it is hoped to show that besides there being an increased incidence of essential hypertension and toxæmia associated with obesity there are a number of other complications which may occur and which add to the hazards to both mother and child.

Material and Method

The case notes of 3,000 consecutive deliveries which occurred in the Louise Margaret Hospital, Aldershot, during the years 1953-7 were examined. Of this number, 1,855 were regarded as spoilt for the purpose of the investigation either because they contained insufficient data concerning the patient's weight, height, or blood-pressure or because when first seen the period of gestation was greater than 20 weeks. This left a total of 1,145 cases available for examination.

The first difficulty was how to obtain an estimate of the patient's normal body weight, as none, of course, were seen before pregnancy began. Rather than rely on vague estimates given by the individuals themselves—this in any event was impossible in a retrospective survey—it was decided to calculate the expected normal weight from a knowledge of her height, age, and period of gestation (provided this was less than 20 weeks) and then compare it with her actual weight at that time.

For this purpose use was made of the Pulheims standards for Service girls as used in the medical grading of recruits to the armed Services. These standards state the normal weight of the girl as based on height and age. To adjust the weight to the period of gestation 1 lb. (450 g.) is added for every week after the twelfth week.

Table I shows how the normal or expected weight of an individual can be reckoned at a glance.

Although obesity and overweight are not strictly speaking synonymous terms, as was pointed out by Sinclair (1953), nevertheless in this investigation the term obesity refers to overweight. Armstrong, Dublin, Wheatly, and Marks (1951) referred to anyone who weighed more than 10% above ideal weight for height as being obese, but in this survey the patient was regarded as obese if her actual weight exceeded her calculated weight by 14 lb. (6.4 kg.) or more.

TABLE I.—Normal or Expected Weight of Patients Aged 18-19 Years During First Half of Pregnancy

Height in Inches	Period of Gestation in Weeks									
	>12	12	13	14	15	16	17	18	19	20
58	117	118	119	120	121	122	123	124	125	126
59	119	120	121	122	123	124	125	126	127	128
60	121	122	123	124	125	126	127	128	129	130
61	123	124	125	126	127	128	129	130	131	132
62	126	127	128	129	130	131	132	133	134	135
63	129	130	131	132	133	134	135	136	137	138
64	132	133	134	135	136	137	138	139	140	141
65	135	136	137	138	139	140	141	142	143	144
66	139	140	141	142	143	144	145	146	147	148
67	143	144	145	146	147	148	149	150	151	152
68	147	148	149	150	151	152	153	154	155	156

For ages 20-24 add 3 lb.; 25-29 add 6 lb.; 30-34 add 9 lb.; 35-40 add 14 lb.; and 41-44 add 17 lb.

Of the 1,145 cases, 231 (20.2%) were overweight, 288 (25.1%) were intermediate, and 626 (54.7%) were normal or underweight. It will be noticed that about one in five of all patients were considered to be overweight when the above criteria were applied.

Results

Pregnancy.—It will be seen from Table II that seven times more patients in the overweight group started their pregnancies with blood-pressure of 140/90 or more than in the normal group. From this it is safe to assume that there was a greater incidence of essential hypertension in association with obesity. Likewise with the signs that go to make up the syndrome of

TABLE II.—Frequency With Which the Complications Associated With Pregnancy Occur in the Two Groups

	Normal		Overweight		1957	
	No.	%	No.	%	No.	%
Blood-pressure over 140/90 at first visit	5	0.8	13	5.6		
Blood-pressure over 140/90 on two or more occasions	28	4.5	52	22.2		
Albuminuria	19	3.0	13	5.6		
Oedema	66	10.5	74	32.0		
Pre-eclampsia	25	4.0	44	19.0	27	3.4
Ante-partum haemorrhage	6	1.0	15	6.5	21	2.6
Breech presentation diagnosed	94	15.0	31	13.4		
External cephalic version successful	81	86.2	23	74.1		
External cephalic version failed	13	13.8	8	25.8		

pre-eclampsia there was a greater incidence in the overweight group. Pre-eclampsia itself, as diagnosed by the presence of two or more of the triad of signs, was four and three-quarter times more common in the obese subject. These figures can be compared with the rate of 3.4% of patients admitted to the hospital with toxæmia in 1957. Not surprisingly ante-partum haemorrhage is six and a half times higher in the second group than in the first and is probably accounted for by an increase in the number of toxæmic accidental haemorrhages.

Breech presentations were diagnosed slightly more often in the normal group, probably not because they occurred any more frequently but because palpation and diagnosis were easier. As might be expected correction of the breech presentation was found to be more difficult in the obese subject, probably on account of the greater thickness of the abdominal walls.

Delivery.—Surgical induction of labour was performed three times more often in the overweight group, while labour itself was more likely to be prolonged in both the primigravida and the multipara. The increased incidence of surgical induction is largely related to the higher incidence of toxæmia of pregnancy, while the complications of prolonged labour and incoordinate uterine action have long been known to be associated with body build and obesity. Again, and for similar reasons, it is not surprising to find that the combined forceps delivery and caesarean section rate was twice as high in the presence of obesity. Post-partum haemorrhage as defined as a loss of 20 oz. (570 ml.) or more was four and a half times more frequent in the presence of overweight. Table III indicates the frequency with which the above complications occurred and compares them with the overall rate for the hospital in 1957.

TABLE III.—Frequency With Which the Complications Associated With Labour Occur in the Two Groups

	Normal		Overweight		1957	
	No.	%	No.	%	No.	%
Surgical induction of labour	66	10.5	80	34.6	97	12.1
Prolonged labour:						
Primiparae (over 36 hours)	16	2.6	8	3.5		
Multiparae (over 20 hours)	9	1.4	5	2.2		
Forceps delivery/caesarean section	50	8.0	41	17.8	70	8.7
Post-partum haemorrhage	12	1.9	21	9.1	20	2.5

The Foetus.—As might be anticipated, the size of the foetus bore a direct relation to the mother's weight. Thus it was found that in the overweight group 50.2% of all offspring weighed more than 8 lb. (3,630 g.), whereas only 22.5% in the normal group weighed as much. As regards infants at the other end of the weight scale, the proportion of children who weighed less than 6 lb. (2,720 g.) was approximately the same in both groups. The higher-than-anticipated rate in the overweight group could probably be accounted for by the greater incidence of toxæmia in this group. The overall foetal wastage in the overweight group was more than four times that of the normal group. In those infants who did survive, breast-feeding failed for one reason or another in 27.7% of the overweight group in comparison with 16.1% in the normal group. Table IV demonstrates these points.

TABLE IV.—Frequency With Which the Complications Associated With the Foetus Occur in the Two Groups

	Normal		Overweight		1957	
	No.	%	No.	%	No.	%
Size of foetus:						
< 6 lb. (2,720 g.)	63	10.1	20	8.7		
6–8 lb. (2,720–3,630 g.)	422	67.4	95	41.1		
> 8 lb. (3,630 g.)	141	22.5	116	50.2		
Foetal loss	13	2.1	20	8.7	18	2.2
Failure of breast-feeding	101	16.1	64	27.7		

Discussion

From these investigations it will be seen that as a result of obesity there are four main complications which may

affect the pregnant patient directly—namely, essential hypertension, a large baby, failure of lactation, and malpresentation. This last finding is based on a lower incidence of diagnosed breech presentation in the overweight group and a greater incidence of failure to correct the malpresentation in the same group.

Consequent upon the hypertension there are then a number of indirect complications which may befall the patient. Toxaemia of pregnancy is by far the most important of these and this in its turn exposes her to further difficulties. The accompanying Diagram shows how this state of affairs may be represented. It will of course be realized that a number of these indirect complications may themselves lead to a greater incidence

of other complications in the same group. The result of all this is that the obese person is at a much greater risk in pregnancy than her slimmer sister. This being the case, such patients are very worthy of close attention before a pregnancy is embarked upon, during pregnancy itself, and subsequent to delivery.

If the opportunity arises of seeing such a patient before a pregnancy starts it is advisable to try to get the weight down to within normal limits before recommending that conception be attempted. When time is not urgent such weight reduction should be done by means of a well-balanced low-calorie diet. Appetite-depressing drugs may be used but are not essential, and the patient should be made to realize that there are no short cuts to loss of weight apart from perseverance with diet. With these patients it is often a help if weight targets are set.

When the individual is seen for the first time in pregnancy the problem is, of course, much more urgent, and here dieting has to be more strenuous. Where obesity is very marked it is not enough that the patient should not gain weight in pregnancy; rather it is desirable that weight should actually be lost in an amount in direct relationship to the degree of overweight. To obtain this result such patients are put on an almost carbohydrate-free diet to begin with and allowed to eat fats and proteins as desired. Provided the diet is adhered to, weight is lost rapidly, and then after a week or two restricted carbohydrates may be given, the amount being regulated by weekly weighings. With such a regime it is important to give adequate dosage of vitamin supplements.

It is not felt that measures such as salt restriction or the giving of diuretics are indicated unless there is evidence of fluid retention or toxæmia itself is present. As the latter is a common complication in such pregnancies frequent examinations are necessary in order that the condition may be diagnosed as early as possible. Once it is present there is no justification for treating the case as an out-patient.

Malpresentations, being more frequently overlooked, are more apt to be allowed to persist and therefore greater care is needed in abdominal examination to prevent this. Where there is doubt concerning the presentation of the foetus after the 34th week it is advisable to carry out x-ray examination. Likewise, because such malpresentations are more difficult to correct in the obese subject, it is more often necessary to employ anaesthesia during corrective manipulation. In labour greater use should be made of vaginal examination if such malpresentations are not to be missed.

It was Sheldon (1949) who pointed out that after each pregnancy there was apt to be a progressive gain in weight; hence the importance of following these patients up in the puerperium and later. It is probably not a good thing to recommend strict dieting to a mother who is breast-feeding, but once this has finished a strenuous effort should be made, both by exercise and by dieting, to get a return to normal weight. Even while breast-feeding the *status quo* can be maintained if a liberal but controlled diet is given.

Finally, let it be said that obesity, although such a common condition that it is too often taken for granted, should be recognized as a disease and as a disease which during the reproductive phase of a woman's life may have disastrous results both to the mother and to her child. It is, however, a condition which can be cured or at least which can be controlled given sufficient will-power on the part of the patient and an equal amount of perseverance on the part of her medical attendant.

Summary

From the case notes of 3,000 consecutive deliveries, 1,145 were found suitable for a study of how obesity could complicate pregnancy.

One in five patients of those investigated were regarded as overweight according to the criteria accepted for the purpose of the investigation.

The results show that where obesity is present pregnancy is much more likely to be attended by essential hypertension and pre-eclamptic toxæmia; breech presentations are diagnosed less frequently, and when diagnosed are less amenable to correction; also ante-partum haemorrhage occurs more frequently.

Labour is induced more often in such patients, is more likely to be prolonged, and often results in delivery either by forceps or by caesarean section. Haemorrhage in the third stage is also more common.

Foetal loss is much higher in these patients; their infants are larger and breast-feeding fails more often.

Some suggestions are made for the management of obesity when associated with pregnancy.

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STAPHYLOCOCCUS PYOGENES AND THE BARBER'S SHOP

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The public may be exposed to pathogenic staphylococci from a number of sources during normal daily activities. Nisbet and Skeoch (1949) found that 20% of bank notes examined by them were contaminated with pathogenic bacteria, including haemolytic streptococci and *Staph. pyogenes*. Ward and Tanner (1921), studying the bacteriology of coins, found only spore-bearing organisms, and concluded that the toxic action of metallic surfaces accounted for the absence of common pathogens. The importance of these findings will relate to the circumstances under which contact takes place, and in many instances there will be little danger to public health.

The part played by friction and minor traumata in the initiation of staphylococcal skin sepsis has been well established since the original observation of Garré (1885). We have been impressed by the number of patients who complain that crops of boils or furuncles appear after a visit to the barber. The high incidence of staphylococcal lesions on the head and neck make it likely that the barber's instruments will become heavily contaminated during the course of a day's hair-cutting. The large number of customers passing through the shop in quick succession permits widespread transmission of the organisms, while the friction and minor skin traumata associated with hair-cutting may initiate active sepsis.

Present Investigation

This investigation was undertaken to determine the extent to which hairdressing establishments may be responsible for the spread of staphylococcal sepsis among the general public. It was further designed to test the efficiency of antibacterial measures that are commonly adopted for the protection of the customer.

Scope of Investigation.—A total of 197 shops were visited over a period of three weeks. Approximately equal numbers of male and female hairdressing establishments were examined (109 male, 88 female), and these were widely scattered over the city and suburban areas (see Fig.). Testing was carried out during the course of a routine inspection by the Department of Health, and, in addition to bacteriological investigations, records were made of the general state of cleanliness of the premises and of the methods, if any, used to clean and disinfect instruments after use.

Materials and Methods.—Cotton-wool swabs, moistened in nutrient broth, were taken from a variety of instruments, brushes, and other equipment. Towels and cloths were examined by the percussion