had died), and these were all reassessed. In 61 (32%) the haemoglobin level was below 80%. Hypochromic anaemias, of the non-specific variety, accounted for 55 (50 in females). The reasons for these relapses were generally failure to continue with iron therapy.

As a result of this study it is recommended that full facilities for investigations be given to all family doctors in at least one hospital in each local hospital group; that more teaching be given to undergraduates and post-graduates (in general practice) on the frequency of anaemia and on the principles of successful management; and that the importance of the long-term treatment and follow-up of the particularly vulnerable group of women in their later reproductive phase (that is, 30–50) is appreciated. It is quite useless to treat those women by a prescription for 100 iron tablets and then to forget all about them. Treatment, with regular blood tests, is necessary right up to and well past the menopause.

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# PREVALENCE OF ANAEMIA IN THE GENERAL POPULATION

## A RURAL AND AN INDUSTRIAL AREA COMPARED

BY

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The results of a study of the prevalence of anaemia in an industrial community, the Rhondda Fach, have already been published (Kilpatrick and Hardisty, 1961), and in the present paper the findings are given of a survey carried out for comparative purposes in a rural area, Wensleydale, the largest of the Yorkshire dales.

The inhabitants of Wensleydale had previously been the subject of epidemiological studies by Dr. Pickles, of Aysgarth, and the decision to sample this population was made easy by a fortunate coincidence: Dr. J. S. Lawrence and his colleagues of the Empire Rheumatism Council Field Research Unit had elected to go there to study rheumatic conditions in an agricultural community, and it was decided to join them to determine the prevalence of anaemia in their sample.

### Sample and Methods

Wensleydale is about 35 miles (56 km.) long, and the size of the valley with its scattered population (about 0.04 person per acre) made it impracticable to work on a random sample of the whole population; a representative area was therefore selected. After a private census had been made it was decided to study the population of both sexes, aged 15 and over, in the southern half of the village of Hawes, in three of the near-by hamlets, and in about 40 square miles (103 sq. km.) of the surrounding farming area in the upper end of the dale. Because of the knowledge of the structure of the population in this area it is thought that the subjects studied were a fair but perhaps not an impeccable sample of the population as a whole. The total available population was 547, of whom 412 (75%) were examined. This survey was planned for August and September, 1958, in the hope that the hay harvest would be completed before then, but because of bad weather the harvest was late, and the response rate was therefore lower than in the previous survey. The numbers included in the survey are shown in Table I.

Our base was in the centre of Hawes, where the Manchester University Survey van and trailer provided an almost self-contained unit in which some 30 people were seen each day. Because it was impossible to have full facilities in the van for blood-counting, and so that the findings of this survey would be comparable to the previous studies, the blood taken by venepuncture during one day was each evening taken by road to Kendal and put on the night train so that the samples arrived at the laboratory in Cardiff Royal Infirmary the next morning. The specimens were then examined in exactly the same way as during the Rhondda survey (Kilpatrick and Hardisty, 1961). The arbitrary levels of haemoglobin chosen for "anaemia" were the same—12.5 g./100 ml. (85%) or less for men and 12 g./100 ml. (81%) or less for women.

TABLE I.—*Details of Population Studied*

| Age-group | Men | | Women | |
|---|---|---|---|---|
| | No. Living in Area | No. Examined | No. Living in Area | No. Examined |
| 15–24 | 53 | 29 (55%) | 45 | 32 (71%) |
| 25–34 | 37 | 26 (70%) | 51 | 40 (78%) |
| 35–44 | 54 | 34 (63%) | 52 | 45 (86%) |
| 45–54 | 48 | 36 (75%) | 42 | 34 (81%) |
| 55–64 | 33 | 25 (76%) | 38 | 32 (84%) |
| 65–74 | 27 | 20 (74%) | 37 | 33 (89%) |
| 75+ | 13 | 12 (92%) | 17 | 14 (82%) |
| | 265 | 182 (69%) | 282 | 230 (82%) |

Because this survey was planned purely as a prevalence study no further investigation or treatment was done, but the name of each person found to be anaemic was immediately sent to the general practitioner concerned.

### Results

In men the mean level of each index, except P.C.V., declines fairly steadily with age; there is no fall in P.C.V. until the 55–64 year age-group, but the means thereafter are much lower (Table II). The scatter of values of each index, as measured by the standard deviation, shows a tendency to increase with age, except in the case of the serum iron. This is almost certainly a reflection of an increased proportion of subjects with low values in the higher age-groups.

In women the levels for all indices are lower than those for men, though the differences are much less marked over the age of 65 years (Table II). There is no downward trend of values with increasing age, and

the scatter of values, as measured by the standard deviation, is less evident.

Comparison with the Rhondda data is possible only in men aged 35–64 years and in women aged 55–64. Table III shows the comparison of means and standard errors between Wensleydale men and Rhondda men

TABLE II.—*Haematological Indices. Means and Standard Deviations*

| Age | Hb (g./100 ml.) | | P.C.V. (%) | | M.C.H.C. (%) | | Serum Iron (μg./100 ml.) | |
|---|---|---|---|---|---|---|---|---|
| | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| *Men* | | | | | | | | |
| 15–24 | 14·07 | 0·81 | 44·33 | 2·88 | 31·76 | 0·79 | 142·24 | 47·79 |
| 25–34 | 14·31 | 0·95 | 45·23 | 3·45 | 31·62 | 0·94 | 115·27 | 47·27 |
| 35–44 | 14·32 | 0·94 | 45·03 | 2·60 | 31·79 | 1·32 | 129·94 | 60·19 |
| 45–54 | 14·10 | 1·11 | 44·83 | 3·93 | 31·56 | 2·30 | 126·08 | 95·36 |
| 55–64 | 13·90 | 1·24 | 45·10 | 3·67 | 30·76 | 1·13 | 105·44 | 44·11 |
| 65–74 | 13·15 | 2·07 | 42·95 | 5·35 | 30·60 | 1·96 | 97·06 | 43·18 |
| 75+ | 13·28 | 1·52 | 43·67 | 4·81 | 30·42 | 1·31 | 92·50 | 46·53 |
| *Women* | | | | | | | | |
| 15–24 | 11·87 | 1·96 | 38·59 | 4·82 | 30·63 | 2·18 | 97·19 | 44·44 |
| 25–34 | 12·65 | 1·17 | 40·43 | 3·42 | 31·28 | 1·55 | 92·92 | 38·25 |
| 35–44 | 12·68 | 1·30 | 40·92 | 3·48 | 30·98 | 1·36 | 107·89 | 22·67 |
| 45–54 | 13·12 | 1·02 | 42·10 | 3·35 | 31·12 | 1·15 | 98·09 | 30·01 |
| 55–64 | 13·02 | 1·14 | 41·70 | 3·63 | 31·28 | 1·22 | 99·19 | 40·05 |
| 65–74 | 13·02 | 1·10 | 41·68 | 3·47 | 31·30 | 1·05 | 108·41 | 38·06 |
| 75+ | 12·85 | 1·32 | 42·50 | 4·92 | 30·36 | 1·55 | 91·00 | 44·05 |

TABLE III.—*Comparison of Haematological Indices*

| | Hb (g./100 ml.) | P.C.V. (%) | M.C.H.C. (%) | Serum Iron (μg./100 ml.) |
|---|---|---|---|---|
| *Men aged 35–64 Years* | | | | |
| Wensleydale .. | 14·13±0·12 | 44·94±0·34 | 31·43±0·14 | 121·95± 5·17 |
| Rhondda miners and ex-miners | 14·59±0·07 | 45·60±0·20 | 32·33±0·08 | 119·02± 3·02 |
| Rhondda non-miners .. | 14·73±0·07 | 45·59±0·21 | 32·58±0·09 | 123·81± 3·11 |
| *Women (55–64 Years)* | | | | |
| Wensleydale .. | 13·02±1·14 | 41·70±3·63 | 31·28±1·22 | 99·19± 7·07 |
| Rhondda .. | 13·31±1·65 | 41·69±4·28 | 31·67±1·69 | 103·80± 3·47 |

(miners and ex-miners and non-miners) in the age range 35–64 years. So far as haemoglobin, P.C.V., and M.C.H.C. are concerned the figures found in Wensleydale are significantly lower than those from the Rhondda.

A comparison of the Rhondda and Wensleydale women aged 55–64 years is also given (Table III). As in the comparison of the men the figures for the women of Wensleydale are again lower than those of the Rhondda women.

## Cases of Anaemia

The prevalence of anaemia in the various age-groups is given in summary in Table IV. Anaemia, though uncommon, is to be found in young males; it is found more often as age advances. In women, anaemia is much more common at all ages—strikingly so in fact during the child-bearing years. From 65 years onwards the prevalence of anaemia is similar in men and women. In both sexes at all ages almost all anaemia can be attributed to iron deficiency (Table V); we have, however, no information about how this occurs.

## Discussion

Two findings stand out from the results of this survey. The first is the strikingly high prevalence of anaemia in women of all ages; the second is that, contrary to what might have been expected, the haematological indices are lower in those people living in an agricultural area than in an industrial one. The explanation for the second finding is unknown and would not be easy to discover without extensive sociological investigation. It is probable, however, that diet is a contributory factor, because much of the produce of the relatively small farms in the area is marketed rather than consumed locally.

The finding that as many as 25–30% of females aged 15–34 years are anaemic is surprising, but menstruation and child-bearing probably account for most of the anaemia discovered. There is therefore a strong case for more frequent haemoglobin estimations in women and perhaps the more liberal use of iron, as most of the anaemia is of the iron-deficiency type. Iron-deficiency anaemia in young men is uncommon, but our findings, together with those of the M.R.C. (1945), Shorthouse and King (1951), Leonard (1954), Stewart *et al.* (1957), and Brumfitt (1960), show clearly that it does occur.

About 12% of women in Wensleydale between 55 and 64 years were anaemic—this is in close agreement with the 13.9% found for the women of the Rhondda examined previously. Over the age of 65, however, the prevalence of anaemia in both sexes rose again in Wensleydale to more than 20% of those examined. The finding of so much iron-deficiency anaemia in the older age-groups is at variance with many standard textbooks, but recently other authors have also commented on its prevalence (Lange and Skjaeggestad, 1958; Bedford and Wollner, 1958; Semmence, 1959).

While it is probable that a proportion of the anaemia in older women is the end-result of a chronic anaemic state which starts during the child-bearing years, some additional factor must be involved to explain the increase in its prevalence after the age of 65 years; and

TABLE IV.—*Prevalence of Anaemia*

| Age-group | Men | | Women | |
|---|---|---|---|---|
| | No. Examined | No. Anaemic | No. Examined | No. Anaemic |
| 15–24 | 29 | 1 (3·4%) | 32 | 9 (28·0%) |
| 25–34 | 26 | 0 (0·0%) | 40 | 10 (25·0%) |
| 35–44 | 34 | 1 (2·9%) | 45 | 11 (24·0%) |
| 45–54 | 36 | 3 (8·3%) | 34 | 4 (12·0%) |
| 55–64 | 25 | 2 (8·0%) | 32 | 4 (12·5%) |
| 65–74 | 20 | 4 (20·0%) | 33 | 7 (21·0%) |
| 75+ | 12 | 3 (25·0%) | 14 | 3 (21·0%) |
| | 182 | 14 | 230 | 48 |

TABLE V.—*Type of Anaemia*

| | Men | Women |
|---|---|---|
| Undoubtedly hypochromic (M.C.H.C. 30% or less) | 11 | 31 |
| Borderline (M.C.H.C. 31%) .. .. .. .. | 1 | 12 |
| Normochromic .. .. .. .. .. | 2 | 5 |
| Total .. .. .. | 14 | 48 |

probably this same factor accounts for the anaemia found in the older men. There is much evidence that the factor is blood loss, and anaemia in the elderly should always be carefully investigated with this in mind; but it is quite possible that other factors, such as dietary insufficiency, may also play a part in its causation.

## Summary

A survey to determine the prevalence of anaemia in an agricultural community, Wensleydale, was carried out in August, 1958. A sample of men and women aged 15 and over was examined and a comparison made with

the results of a previous survey in an industrial community, the Rhondda Fach. In comparable age-groups the mean values for haemoglobin, P.C.V., and M.C.H.C. were significantly lower in Wensleydale than in the Rhondda.

In Wensleydale the prevalence of anaemia in males aged 15–24 was 3.4%, falling to zero in those aged 25–34 and then rising in later decades to 25% in the one 75 years and over. In females of 15–24 years the prevalence of anaemia was 28%. This figure fell to 12% in age-group 55–64 years and subsequently rose to 21% in the later age-groups. Most of the anaemia was of the iron-deficiency type.

Many people contributed to the success of this survey, which was carried out during the tenure of a Cardiff Royal Infirmary Research Fellowship in Medicine. It is a pleasure to acknowledge my indebtedness in particular to Dr. J. S. Lawrence, Dr. Joan M. Bremner, and the members of the Empire Rheumatism Council Field Research Unit; to the Board of Governors of the United Cardiff Hospitals for their generous help and ready provision of facilities; to the staff of the Medical Unit and Institute of Pathology of the Welsh National School of Medicine for secretarial and technical assistance; to Mr. P. D. Oldham, of the Medical Research Council, for statistical advice; to Dr. William Phillips for leave of absence; to all the people of Wensleydale who so willingly co-operated in this survey; and finally to Professor H. Scarborough, Professor A. L. Cochrane, and Dr. R. M. Hardisty for their constant encouragement, interest, and advice.

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# CLINICAL TRIAL OF METHOSERPIDINE IN GENERAL PRACTICE

BY

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Methoserpidine ("decaserpyl"), a synthetic isomer of reserpine, is a hypotensive drug prepared by Velluz (Velluz *et al.*, 1958a; Velluz, Peterfalvi, and Jequier, 1958b; Velluz, 1959). Previous reports on the drug (Velluz *et al.*, 1958b; La Barre, 1960; Mir and Lewis, 1960) have shown that the hypotensive properties of the rauwolfia preparations have been retained while the undesirable side-effects have been practically eliminated.

Trials in 1959 and 1960 (Brun and Rondelet, 1959; Gros *et al.*, 1959; Mériel *et al.*, 1959; Merlen and Gérard, 1960; Tricot *et al.*, 1960) showed an effective reduction of diastolic pressure—that is, generally at least 20 mm. Hg in two-thirds of hypertensive patients. These reports mention marked subjective improvement—relief of headache, giddiness, and tinnitus, and a feeling of general well-being. Bradycardia in some cases was also noted. In these trials the dosage ranged from 15 to 60 mg. daily by mouth, 30 mg. daily being the most suitable dose in the majority of cases. Side-effects were uncommon. There were occasional instances of nausea and epigastric discomfort, and more rarely diarrhoea or nasal congestion. Previous reports refer to the absence of major depressant effects on the nervous system even with 100 mg. or more a day.

It has been our experience with hypotensive drugs in general practice that they do not on the whole achieve the results claimed for them on the basis of hospital trials. It would appear that the effect of a drug on a patient living a normal everyday life is very different from that on a patient undergoing hospital regimen. We found that small doses of many drugs in ambulant patients did not produce a significant or maintained hypotensive effect. Larger doses often produced unpleasant side-effects.

We decided to carry out a trial of methoserpidine on hypertensive patients drawn from three separate practices in Glasgow. The duration of the trial was one year. Many of the patients were known to be hypertensives. Practically all had subjective complaints due to hypertension. No patient was included in the trial who was already progressing favourably on alternative treatment.

Of the 48 patients treated, 43 suffered from benign essential hypertension. The other five were cases of hypertension with aortic incompetence, hypertension with thyrotoxicosis, pre-eclamptic toxaemia, pre-malignant hypertension, and malignant hypertension.

## Method

The patients were initially assessed objectively and subjectively. They were seen weekly or fortnightly at first, and in some cases the intervals were later extended to a month. The initial dosage of methoserpidine depended upon the overall clinical assessment. The dose was increased or decreased at subsequent attendances until a suitable maintenance dose was achieved. From experience we found that 30 mg. in three divided doses was the best initial dosage in most cases.

To assess the hypotensive effect of the drug, the means of all the systolic and diastolic readings taken during the trial have been calculated for each patient and compared with the *lowest* level of blood-pressure previously recorded in the absence of any hypotensive drug therapy. This method of assessment has been used because, in the absence of a double-blind technique, it provided us with the best safeguard against introducing a bias into the results.

## Results

The principal data in each of the 43 cases of essential hypertension are summarized in Table I. The frequency of the different dosage levels initially and that at the termination of treatment or of the trial are shown for comparison in Table II.