

SURVEY OF HAEMOGLOBIN, BLOOD UREA AND PLASMA URIC ACID CONCENTRATIONS AMONG A SAMPLE OF THE MALTESE POPULATION

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Summary

Following a study of 292 male and 41 female blood donors aged 18 to 65 years, it was found that the average haemoglobin concentration is 14.5 mg./100 ml. for males and 12.7 mg./100 ml. for females; Uric Acid values average 4.9 mg./100 ml. among males and 4.3 mg./100 ml. among females; and the mean blood urea values for males and females are 31.8 mg./100 ml. and 30.9 mg./100 ml. respectively.

No correlation was noticed between these values and the ABO Blood group system.

Most of the blood donations came from people whose age ranged from 25 to 49 years.

The primary purpose of this survey was to establish the averages of haemoglobin concentration, blood urea level and Plasma Uric Acid in a sample of the Maltese population.

Collection of Samples

This survey was made on blood donors to the Blood Transfusion Centre at St. Luke's Hospital. Amongst the relatives of patients young men of blood Group O were chosen for preference; this partly explains the low proportion of older subjects and of women, as well as the high percentage of group O donors.

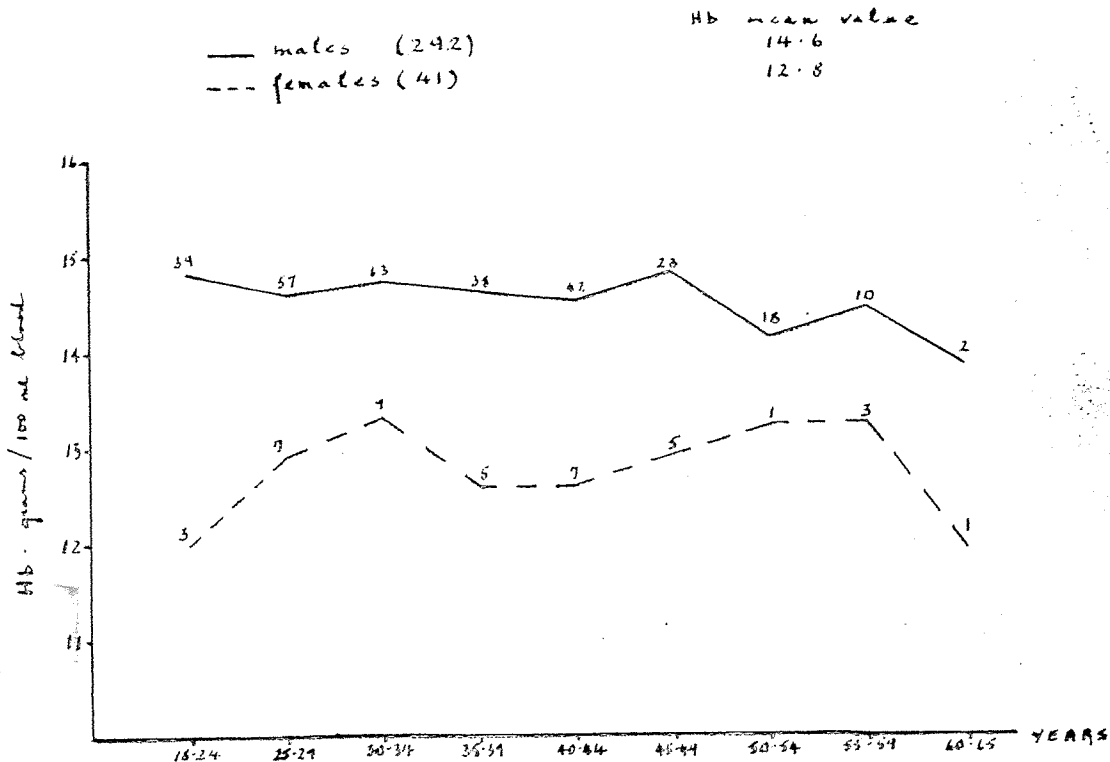
Potential donors who were rejected for health reasons were not included.

Blood samples taken at the end of donation with the donor supine, were collected in 5ml. disposable bottles containing Heller and Paul (1934) anticoagulant. Each sample was, in all cases, drawn from the same taking set and the same vein — usually the antecubital vein — used for blood donation.

Haemoglobin estimations were performed within an hour of collection. Cyanmethaemoglobin was determined by diluting 0.02 ml. of blood in 5 ml. of modified Drabkin's reagent. The dilution was compared with a standard Cyanmethaemoglobin solution (obtained from the International Committee for Standardisation in Haematology) using a Unicam S.P. 1300 colorimeter with an Ilford 625 yellow green light filter.

Haemoglobin concentration

There are conflicting results in the various numerous surveys of haemoglobin estimation as affected by age and sex. Hobson and Blackburn (1952) demonstrated a fall in the haemoglobin concentration in both men and women after middle age, while Hawkins *et al.* (1954) have shown a fall in the haemoglobin level of man only after middle age. Cruickshank (1970) showed that while there is a progressive and significant decrease of haemoglobin



Graph 1

concentration in men, on the other hand there is a progressive and significant increase of haemoglobin concentration in women. Our survey — the results of which are shown on Graph 1 — shows that the haemoglobin concentration remains more or less constant until old age in both men and women.

Blood urea levels

In normal adults the blood urea varies according to the protein intake from 12 to 47 mg./100 ml. (Wootton, King and Smith 1957). The actual value for each healthy individual is approximately twice the nitrogen intake in gms./day, e.g. if the nitrogen intake is 11 gms./day, the blood urea averages 22 mg./100 ml. Campbell *et al.* (1968) give a mean value for men of 31.8 mg./100 ml. and for women 28.7 mg./100 ml. These correspond exactly with the values given by Keyser *et al.* (1967).

As Heller and Paul anticoagulant has ammonium oxalate as one of its constituents, urea estimations could not be determined by the urease method; hence measurement of urea level was done by the Diacetyl Method. Estimations were performed the day after blood had been collected.

Table 1 shows that the mean blood urea value is 31.8 mg./100 ml. for males and 30.9 mg./100 ml. for females, figures which compare very well with those of Campbell *et al.*

Table I

Age Groups	18-29	30-39	40-49	50-65	All Ages
Plasma urea values in Males	30.1	31.8	32.5	32.9	31.8
Plasma urea values in Females	29.9	29.6	29.4	35	30.9

Plasma uric acid values

What constitutes the normal range and the mean plasma Uric Acid for both males and female is still to some degree a matter of controversy. Wootton (1951) gives the normal range for plasma Uric Acid as 2 to 7 mg./100 ml. On the other hand C. H. Gray (1967) gives the accepted range as 3 to 5 mg./100 ml. and Milne (1970) gives 2 to 6 mg./100 ml. as the normal range for plasma Uric Acid. Pearce and Aziz (1969) give a mean plasma Uric Acid value of 5.28 mg./100 ml. for males and 4.47 mg./100 ml. for females, Popert and Hewit found a mean of 4.5 mg./100 ml. in 436 males but the levels ranged from 1.9 mg. to 8.1 mg./100 ml.

In our study plasma uric acid estimates were carried out within 24 hours of blood collection. The method followed is that described in King and Wootton 3rd edition 1956. The Standard was prepared from B.D.H. Stock Standard Solution and the results were read on a Unicam Colorimeter using an Ilford 608 light filter. So-

47%	O +ve	5.2%	O -ve
39.7%	A +ve	3.3%	A -ve
2.4%	B +ve	1.4%	B -ve
1%	AB +ve	0%	AB -ve

This should not be taken as representative of the distribution of the various blood groups in the Maltese population in view of our preference for donors of blood group O among relatives of patients.

In fact it does not correspond with the percentages issued yearly by the Blood Transfusion Centre at St. Luke's Hospital. This table shows the mean percentages of the past four years.

37.7%	O +ve	3.7%	O -ve
43.9%	A +ve	4.2%	A -ve
6.6%	B +ve	0.7%	B -ve
3.0%	AB +ve	0.2%	AB -ve

The age distribution of the various blood donors shows that the bulk of blood donation comes from age groups 25-29 and 30-34. However, as can be seen from Table 3: blood donors come in fairly large

Table 3

Age & Sex	Distribution of Blood Donors									
	Age Groups	18-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-65
Males per cent		13.4	19.5	21.6	13.0	14.3	7.9	6.2	3.4	0.7
Females per cent		7.3	17.1	22.0	12.2	17.1	12.2	2.4	7.3	2.4

dium cyanide — urea reagent and uric acid standard solution were prepared fortnightly.

The results of this survey show, in Table 2: a mean plasma uric acid of 4.9 mg./100 ml. for males and 4.3 mg./100 ml. for females, but the levels ranged from 1.6 to 9.4 mg./100 ml. There was no significant rise in level of Uric Acid with advancing age.

Table 2

	18-29	30-39	40-49	50-65	All Ages
Males	4.9	4.8	4.9	5.1	4.9
Females	4.0	4.5	4.2	4.5	4.3

Classification of the blood donors under study according to their ABO and Rhesus Blood groups yielded the following percentages.

numbers from all age groups between 18 to 44 years with a trickle of donors above 45 years.

Professor Acheson and Dr. Florey have noted in their study an intriguing relationship between the ABO blood group system and the plasma uric acid level, with higher values among persons of blood

Table 4

Relationship between Blood Groups and Uric Acid

Blood Groups	Uric Acid Mean Value
A	4.8
O	4.8
B	4.4
AB	5.5

group A, and lower values among AB individuals. No such relationship was observed in our survey. See *Table 4*.

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