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SUGGESTED REFERENCE RANGE OF ESR FOR HEALTHY IRAQI MALE WORKERS BELOW FIFTY YEARS OF AGE

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Key Words : ESR, Male workers, Age, Iraq

قترح تحديد المدى الاعتيادي لترسب كريات الدم الحمراء للذكور العراقيين الاصحاء ذي عمر اقل من خمسين سنة

خلاصة :

اجراء مسح وبائي صحي على ١٠٩٨ شخص من الذكور الذين تتجاوز مدة خدمتهم في العمل خمس سنوات فاكثروا في منشأة القادسية العامة. تم استخدام الارتداد المتعدد كاختبار لفحص علاقة بين المتغيرات احصائية. لقد وجد زيادة في سرعة ترسب الكريات الحمراء وبشكل عالي من ثبوت مرتبطاً مع زيادة العمر وداء السكر والم اسفل الظهر ولكن ليس مع ارتفاع ضغط الدم او الي الساقين. لقد تم تحديد المدى الاعتيادي لترسب كريات الدم الحمراء للذكور الاصحاء ومن ثقل ما اظهروا عن خمسين سنة فوجد يتراوح بين صفر و ٢٤ ملم/ساعة.

SUMMARY :

A cross-sectional epidemiological survey was conducted on 1098 male employees who spent more than five continuous years in AL-Qadissiya State Establishment Factory. Elevated erythrocyte sedimentation (ESR) was found to be associated significantly with increasing age, diabetes and low back pain, but no such relation was found with hypertension and varicose veins. The suggested reference range of ESR for healthy male workers below fifty years of age was found to be 0-24 mm (West.) /hr.

INTRODUCTION :

ESR is expressed as the vertical distance of fall of RBCs in a column of blood measured at the end of first hour and is expressed in mm/hr. It is influenced by a number of interacting factors related to plasma⁽²⁾ and red cells⁽³⁾. Although, ESR is a non-specific indicator of disease, it is one of the most commonly performed laboratory tests. In Scandinavian countries the ESR performed by Westergren's method, has been one of the most commonly employed tests to separate disease from health⁽³⁾. Westergren's original values (men 3mm/hr, women 7mm/hr) are now generally thought to be too low to be of practical value especially in older people⁽⁴⁻⁶⁾. Several surveys^{7,8} involving large group of health

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people in active work suggested that the upper limit of normal in persons aged under 50 may be as high as 15-20 mm/hr in men and 25-30 mm/hr in women, where as an authoritative review⁽⁹⁾ recommended values of 10 and 12 mm/hr, respectively. Griffiths et. al⁽⁶⁾ suggested that an ESR exceeding 19 mm/hr. in elderly men warrants investigation. When establishing reference range for a diagnostic test, disease prevalence should be taken into account because when disease prevalence is low as established in health surveys, a test with high specificity will give the greatest efficiency⁽¹⁰⁻¹²⁾. On reviewing the Iraqi medical journals, no study is available on the normal reference range of ESR among the Iraqi healthy male workers. Thus, this present study was conducted aiming in addition to find the relation of ESR with certain work related diseases.

MATERIAL AND METHOD:⁽¹³⁾

A proportion of the employees at AL-Qadissya State Establishment Factory were included in the present study.

- 1- The factory comprised nine departments and is specialized in the production of small and medium mechanical spare parts produced by different technology.
- 2- 2530 male workers were working during the period of the study (1991-92); the females were excluded because their number was small (95 females).
- 3- Only workers with 5 years or more of continuous employment were chosen (1119 workers) for this survey as they represent as stable population. Only 1098 workers responded to this study which comprised 41.8% of the total manpower employed by the factory.
- 4- Each worker was interviewed to give his reply to the specific questionnaire in the form designed for the survey.
- 5- Everyday, 6 workers were clinically examined and tested for the conditions designe in the project of the health survey of the factory⁽¹³⁾. These included the followings :
 - a- Blood pressure measurment (mm Hg).
 - b- Clinical examination for contact dermatitis.
 - c- Clinical examination of the spine for possible causes of low backpain, e.g disc herniation, inflammatory disease, soft tissue damage.
 - d- Measurement of fasting blood sugar level (mg/dl).
 - e- ESR measuement (mm/hr) ESR was measured using the Westergren's method⁽²⁾. From each worker, 2 ml venous blood was mixed directly with 0.5 ml 3.8% trisodium citrate (4 : 1 ratio) in a plastic tube labelled with the name and serial

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workers working in metallurgic industry. The upper limit value of normal ESR among male workers below 50 years of age is found to be 24 mm/hr which is slightly higher than that recommended by Bottiger and Sredberg⁽³⁾ (0-20 mm/hr).

Table 1: The association between abnormally accelerated ESR and other variables

The Variabl	Total	ESR >20		ESR <20		d f	x ²
		No.	%	No.	%		
Age (years)							
20-29	583	33	5.7	550	94.3	3	41.2***
30-39	359	48	13.4	311	86.6		
40-49	125	17	13.6	108	86.4		
50 +	31	11	35.5	20	64.5		
Year of employment							
5-9	654	35	5.4	619	94.6	3	39.8***
10-14	159	30	18.9	129	81.1		
15-19	182	30	16.5	152	83.5		
20 +	103	14	13.6	89	86.4		
Glucose							
Normal	941	85	9.0	856	91.0	2	18.3***
Impaired gl tol.	126	14	11.1	112	88.9		
diabetes	31	10	32.3	21	67.7		
Departments							
Production	646	54	8.4	592	91.6	6	8.8
Technical	94	15	16.0	79	84.0		
Maintenance	106	15	14.0	91	86.0		
General service	70	9	12.9	61	87.1		
General administrative	71	6	8.5	65	91.5		
Plastic moulding	38	4	10.5	34	89.5		
Surface treatment	73	6	8.2	67	91.8		
Low back pain							
Yes	183	38	20.8	145	79.2	1	28.9***
No	915	71	7.8	844	92.2		
Blood pressure							
Normal	968	91	9.4	877	90.6		
Hypertension	130	18	13.9	112	86.1	1	2.5

*** P < 0.005

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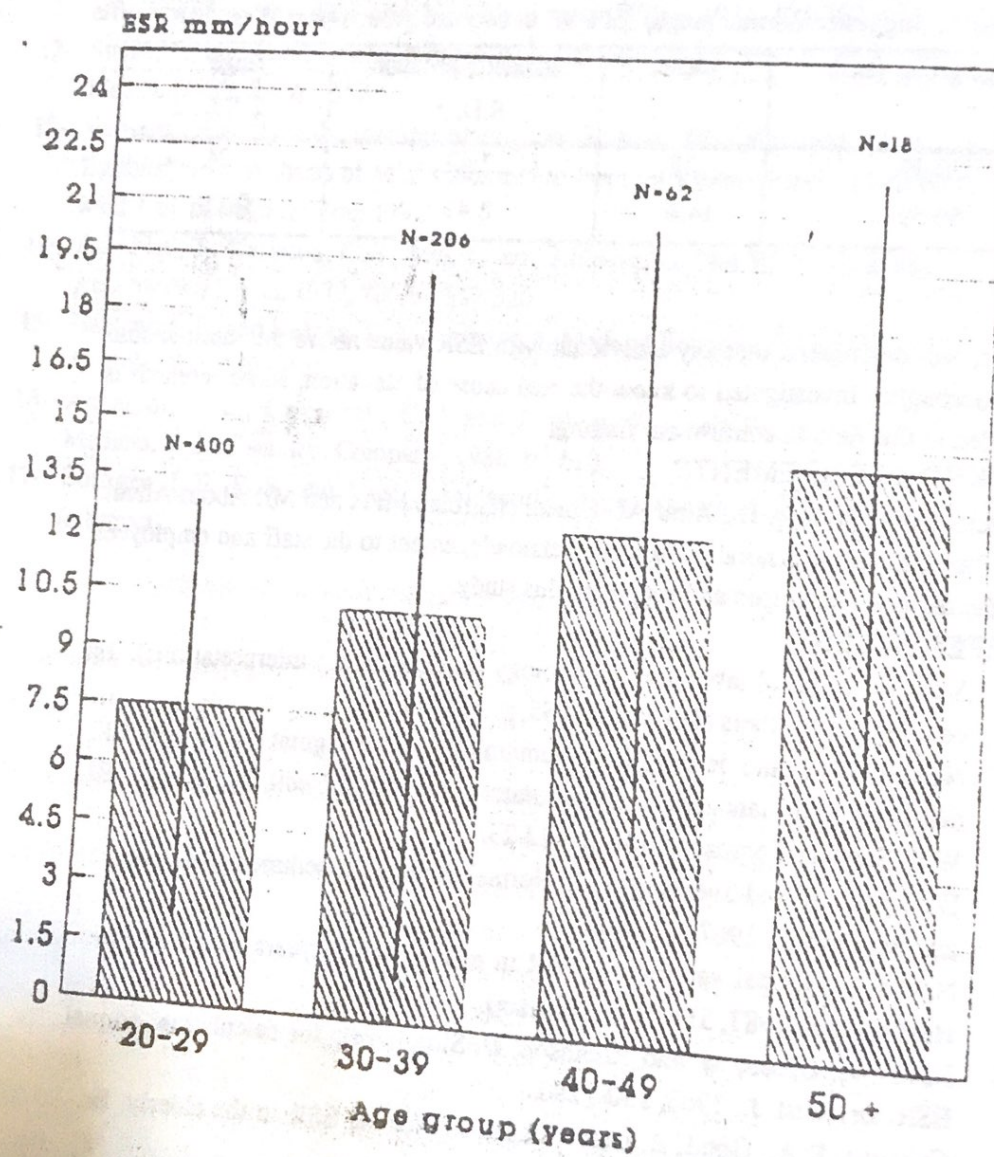


Fig :1 mean $\pm$ SD of ESR values by age groups for healthy male employees.

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Table 2 : Suggested normal ranges for ESR in two age groups (mm West./hr)

Age group years	mean	standard deviation S.D. $\pm$	range 2 S.D. $\pm$
20-49	8.8	7.43	0-24
50-59	14.4	8.42	0-31

Thus, we recommend that any individual with ESR value above this limit should be thoroughly investigated to know the real cause of elevation. More research is needed in this field to confirm our finding.

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REFERENCES :

- 1- Sood, R. Medical laboratory technology (methods and interpretations). 1st edit. Jaypee Brothers New Delhi 1985, p: 111- 113.
- 2- Nelson, D.A. and Henry, J.B. Hematology and coagulation in clinical diagnosis and management by laboratory methods 17 edit. by Henry BJ. W.B. Sanders Company 1984, p: 622-23.
- 3- Botiger, L.E. and Svedberg, C.A. Normal erythrocyte sedimentation rate and age Br. Med. J., 1967, 2 : 85-88.
- 4- Nayha, S. Normal variation in ESR in males over 50 years scand. J. Prim. Health Care., 1987, 511 : 5-8 (Abstract).
- 5- Miller, A. Green, M. and Robinson, D. Simple rule for calculation normal ESR. Br. Med. J., 1983, 280 : 286.
- 6- Griffiths, R.A., Good, R.A and Watso, P. Normal ESR in the elderly. Br. Med. J., 1984, 287 : 724-725.
- 7- Marry, L. Haematologic diseases. 1st edition, Little Brown, 1988, P : 80-81.
- 8- Ratnsson, R., Bengtsson, C., Laennartson, J., Linqvist, Noppa, H., and T. bblin, E. ESR in a population sample of women with special reference to its clinical and prognostic significance, Acta Medica Scand., 1979, 206 : 207-14.
- 9- Lewis, S.M. ESR and plasma viscosity association of clinical pathology. Broad sheet, 1980, 64 : 1-7.
- 10- K.

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- tests for detecting diseases. *clin. Lab. Heam.*, 1981.
- 11- Gallen, R.S. and Cambino, S.R. Beyond normality the predictive value and efficiency of medical diagnosis. New York : Jhon Wiley, 1974, 101-102.
 - 12- Staurt, J., and kenny, m.w. Simple rule for calculating normal ESR. *Br. Med. J.*, 1983, 28, 6 : 557.
 - 13- Hussien, H.A. Healthy survey among workers in AL-Qadissyia State Establishment. A thesis of MSc submitted to Dept. of Comm. Med., Coll. of Med. Uni. of Baghdad, Iraq 1992.
 - 14- Palmblad, J., Karlsson, C.G., levi, L. and Lidberg, L. The ESR and stress. *Acta Medica Scand.* 1979, 205/6 : 517-520.
 - 15- Hazleman, B. and Bulgen, D. low backpain, *Medical Education International J.*, 1981, 25 : 1486-491.
 - 16- Andereoli, T.E., Carpenten, C.C. and J. plum, F. Ceeil Essentials of *Medicin*, W.B. Saunders Company, 1986, p : 610.
 - 17- Bottiger, L.E. ESR and hyper Lipidaemia. *Acta Medica Scand.*, 1973 (Abstract).