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Evaluation of Haematological Parameters of Bankers in Calabar Metropolis

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Abstract

This study assessed some haematological parameters of bankers in Calabar metropolis. A total of 100 people (male and female) between the age of 21 and 60 were recruited for this research, 50 bankers and 50 non-bankers who served as control. 4mls of blood was collected by venipuncture into an EDTA bottle for full blood count and erythrocyte sedimentation rate. Using Microhaematocrit method for packed cell volume (PCV), visual manual method for total white cell count and platelet count, cyanmethaemoglobin method for haemoglobin estimation and, Westergren's method for erythrocyte sedimentation rate (ESR). Results were expressed as means ± standard deviation, while student's t-test and analysis of variance was used for comparison of means; P was statistically significant at <0.05.Of all the haematological parameters analyzed, there was a significant increase in basophil and a decrease in PCV and platelet count ($0.06 \pm 0.31 \times 10^{12}$, 0.42 ± 0.05 l/l, $283.32 \pm 78.20 \times 10^{9}$) in bankers when compared with the control ($0.30 \pm 0.65 \times 10^{12}$, 0.35 ± 0.41 l/l, $253.48 \pm 71.18 \times 10^{9}$) respectively. It also shows that there was a significant reduction in the PCV and the haemoglobin concentration mean ± standard deviation of female bankers (130.72±20.87, 0.40 ± 0.04 l/l) compared to their male counterparts (156.50±26.07, 0.48 ± 0.05 l/l). This study also reveals that based on the duration of service, ESR was (14.44 ± 8.40 mm/hr.) amongst those who have been working for 6 – 10 years, while those who have worked for less than 6years had an ESR of (9.23 ± 7.31). Pearson's correlation showed a strong positive association between PCV and haemoglobin concentration that was significant.

Keywords: haematological parameters, bankers, Calabar Metropolis

Introduction

The effect of the financial sector has been said to be positive, which implies that the financial sector promotes, and is more significant in the growth of a country's economy (Omar and Sulong, 2018; Mbajiuka *et al.,* 2014; Enweani *et al.,* 2021; Eberendu *et al.,* 2018). Number of employees working in this sector has increased as well as the competition and associated stress. Stress can be observed in all fields of work big or small. The International Labour Organization reported a number of worrying issues for workers in financial services; these included greater pressure

on time, problems with ergonomics, conflicting roles, work demands that were considered excessive, difficult relationships with customers, and a rising number of cases of stress and violence (Sabir *et al.*, 2003). Such changes have had relevant effects on bank employees, not just in the workplace but also in their daily lives.

Earlier what was observed in heavy workers involving more of strenuous activities at work places has now become a common entity observed even in sedentary work atmospheres. Due to rapid changes in globalization, economic liberalization, financial progress, technological advancements, stress has entered banking industry. As there has been a rapid spurt of private banks into the arena in the recent years, occupational stress on these employees is crippling their performance and health. Levels of stress depend on working conditions, work load, management, leadership, strict deadlines to achieve ambitious targets and also on the type of banks either government or private (Katyal and Katyal, 2013) Long hours of working conditions in the banking sector creates a stressed mind that adversely affects their health and performance (Khattak *et al.*, 2011). Stress is an issue that is linked with the work one does. There is no standard procedure to track back and pin-point the causation and underlying mechanism of ill health as "Stress" (Brunner and Marmot, 2006). Stress can be observed in all fields of work big or small (Rose, 2003). Some amount of stress is ideal as it makes an individual perform well. However too much of it leads to negative effects on the individual, which can be damaging to the capacities of the person. Employees who are most stressed can develop serious diseases which could adversely affect their performance. Pressure to complete a lot of work in a short time and overload of work, for instance, could be a critical source of stress to bank employees which could reduce their performance. There is evidence for the biological plausibility of the link between psychosocial stressors from everyday life and heart disease (Tarani *et al.*, 2006). Bank employees who are stressed may become poorly motivated, less productive, and unhealthy and less safe at work.

Work place stress has a major impact on personal, professional, organizational and National development. Finance, work and social relationships had a direct effect on the prevalence of insulin resistance, obesity and altered lipid levels (Pyykkonen *et al*., 2013). Job stress has been known to potentiate the onset and the progress of diabetes mellitus, hypertension, bronchial asthma and metabolic syndromes (Kuper and Marmot, 2003). In developing countries, 80% of deaths are due to cardiovascular disease (Mezue, 2014).

The paper was done to access and provide adequate information on some haematological parameters of bankers in Calabar Metropolis, Cross River State.

Materials and Methods

Study area

The area chosen for this research were commercial banks in Calabar Metropolis**.**

Study design

The cross-sectional case-control study design was employed in the study. A total of 100 subjects were enrolled in this study.

Ethical consideration

Ethical clearance was obtained from the Ministry of Health, Cross River State. All participants in this study were well informed and participation was voluntary. Questionnaire was administered and informed consent forms signed by participants**.**

Subjects selection

The subjects used for this research were bankers and non-bankers found in Calabar Metropolis, Calabar, Cross River State.

Inclusion criteria

Apparently healthy individuals working in the bank who gave consent were recruited for the study.

Exclusion criteria

Non-bankers and bankers that did not give consent or were placed on medication.

Sample size

Sample size formula (Prashant and Supriya, 2010)

$$n = \frac{z^2 \times p(1-p)}{d^2}$$

$$N = \frac{1.96^2 \times 0.50(1-0.50)}{0.1^2} = 96 \approx 100$$

Where n= required sample size
z= confidence level at 95% (standard value of 1.96)

p= expected prevalence or proportion (50%=0.5)
d= margin of error or precision (standard value of 10%=0.10)

Sample collection

4mls of blood was collected by venipuncture into EDTA (ethylenediaminetetraacetic acid) containers for FBC and ESR.

Analytical methods

Packed cell volume (PCV)

PCV was analyzed with the microhaematocrit method (Dacie and Lewis, 2012).

Procedure

Blood was mixed gently but thoroughly by inversion. The capillary tube was filled with blood by capillary action. The blood was filled to 2/3 of its length and the excess blood on the tube cleaned with a piece of cotton wool. The dry end of the tube was sealed with a sealant. When using flame, the blood was not too close or exposed to the flame to avoid haemolysis. The tube was placed in the radial grooves of the microhaematocrit centrifuge head, with the open-end towards the centre. The lid then replaced. It was then centrifuged for 5 minutes at 12,000g or 10,000rpm.The centrifuge was left to stop normally. The tubes were removed and the PCV read using the heamatocrit reader. The base of the blood was aligned with the column marked 0, and the bottom of the meniscus of plasma with 100. The PCV was read directly from the haematocrit reader.

Total leucocytes or white cell count

The total white cell count was carried out using the visual manual method (Dacie and Lewis, 2012).

Procedure

0.38ml diluting fluid was measured and dispensed into a khan tube. 0.02ml (20ul) of well mixed blood was taken using micropipette into the diluting fluid and mixed.The counting chamber was assembled, and the cover slip was slid into position over the grid area and presses down on each side until rainbow colours (Newton's rings) were seen.The diluted blood sample was re-mixed. Using a Pasteur pipette, one of the grids of the counting chamber was filled with the sample, taking care not to over fill the area.The filled chamber was left for 1minute undisturbed to allow the cells settle.The underside was wiped and it was placed on the stage of the microscope.Using x10 objective with the condenser iris closed sufficiently to give good contrast, the rulings of the chamber and cells were focused.The cells in the four large corner squares of the chamber were counted, including the cells lying on the lines of two side of each large squares.

Total number of cells per liter of blood was calculated using the 1st principle formula:

$$\text{White cell count per liter} = \frac{N \times DF \times 10^6}{A \times D}$$

Where N =Number of cells counted
DF = Dilution Factor (1:20)
A = Area counted (4mm)
D = Depth of chamber (0.1mm)
10^6 = factor to convert count/ ml to count/L

$$\text{Hence, total leucocyte counts} = \frac{N \times 20 \times 10^6}{4 \times 0.1}$$

Platelet count

Platelet count was done using the visual manual method (Dacie and Lewis, 2011).

Procedure

0.02ml of well mixed anticoagulated blood was added to 0.38ml of 1% ammonium oxalate diluting fluid in a clean khan tube.It was mixed by tapping the tube gently for at least 2 minutes.The chamber was placed on a flat horizontal surface and using firm pressure, the cover slip was then slid into position on the counting chamber. A rainbow effect called Newton's rings appeared on both sides. Little quantity of the diluted blood was taken with a Pasteur pipette and the grid of the counting chamber filled, taking care not to over fill the area.The filled chamber was then placed in a petri dish that contains a piece of moist cotton wool for 20 minutes to allow cells to settle. x10 objective to focus and x40 objectives was used to count the platelets present in the 5 centre of the 25 square boxes (i.e. 5 of the 0.04mm^2 areas

The total number of platelet per liter of the blood was calculated as:

$$\text{Platelet count per liter} = \frac{N \times DF \times 10^6}{A \times D}$$

Where N = number of cells counted
DF= dilution factor (1:20)
A = area counted (0.2mm)
D = depth of chamber (0.1mm)
10^6 = factor to convert count/ ml to count/L
Therefore, platelet count = $\frac{N \times 20 \times 10^6}{0.2 \times 0.1}$

Preparation of thin blood film

Procedure

A microscopic slide was cleaned with cotton wool to remove dust.A small drop of well mixed blood sample was placed on one side of the slide.Hold the slide securely on a flat surface, the right hand was used to place the spreader at an angle of about 45^0 to the slide, then moved back to make contact with the drop of blood.The blood was allowed to flow towards the sides of the spreader.The spreader then pushed gently and quickly forward, making a film in the process.The film was left to completely air-dry, and labelled appropriately.

Staining of a thin blood film (Leishman staining method)

Procedure

The air-dried thin film was kept with smear surface upwards on the staining rack.The entire area of smear not the slide was flooded with Leishman stain.It was allowed to stand for 2 minutes (for cells to be fixed by methanol).The stain was double diluted with buffered water with pH 6.8 for i.e. twice the drops of the stain earlier applied on the smear.The mixture of stain and buffer was blown gently to enhance mixing of the stain with buffer. A metallic sheen formed over the surface of the fluid and it was left to stand for 10 minutes.The slide was rinsed thoroughly with buffer.The reversed side of the slide was wiped using a soft absorbent tissue.The stained slide was stood in a slide rack and allowed to air-dry
The well stained slide appeared salmon pink.

Haemoglobin estimation

The haemoglobin concentration was determined using cyanmethaemoglobin method (Dacie and Lewis, 2012).

Procedure

0.02ml of anticoagulated blood was added to 4ml of Drabkin's solution (1 in 200 dilution).The mixture was mixed properly and allowed to stand for 10mins for the complete conversion of haemoglobin to methahaemoglobin.Drabkin's solution was used as a blank to set the absorbance at zero at a wavelength of 540nm.The standard was read before the test.The concentration of haemoglobin was derived using a haemoglobin calibration curve.

Erythrocyte sedimentation rate (ESR)

The erythrocyte sedimentation rate was measured using the Westergren method.

Procedure

A khan tube was labelled.0.5ml of sodium citrate was taken into the labelled khan tube.

2.0ml of well mixed EDTA anticoagulated blood was pipetted into the tube containing 0.5ml of sodium citrate. The Westergren tube was filled up to mark 0 and place in the rack at room temperature undisturbed and away from sunlight. The reading was taken at exactly 1 hour. Recorded in mm/hr from top surface of column to top of red blood cell sediments.

3 Statistical analysis

Mean, Standard deviation, Student t-test, Analysis of variance and Pearson's correlation was done using SPSS for windows version 21 package (spssinc, Chicago, il).The critical level of significance is $p<0.05$.

Results

Table 1: Socio-demographic data of subjects

Factors	Variables	Frequency n (%)
Age	21-30	23 (46%)
	31-40	15 (30%)
	41-50	9 (18%)
	50 & above	3 (6%)
Working experience	< 6 years	30 (60%)
	6 – 10 years	18 (36%)
	> 10 years	2 (4%)
Department	Bulk room	6 (12%)
	Teller	15 (30%)
	Customer service	5 (10%)
	Cash processing	12 (24%)
	Cleaning	8 (16%)
	Security	4 (8%)
Stressed at work	Yes	41 (82%)
	No	9 (18%)
Had high blood pressure before	Yes	10 (20%)
	No	40 (80%)
Been sick in the course of service	Yes	26 (52%)
	No	24 (48%)
Cause of illness	Cardiac arrest	0 (0%)
	Bacterial infection	6 (18.7%)
	Malaria	24 (72.2%)
	Waist pain	3 (9.1%)
Do you wear gloves and mask when handling currency?	Yes	46 (92%)
	No	4 (8%)
Work Overload		
Have a hard time relaxing?	Never	11 (22%)
	Once in a while	30 (60%)
	About half the time	4 (8%)
	Most of the time	3 (6%)
	Always	2 (4%)

Flexible work time?	Yes	28 (56%)
	No	22 (44%)
Level of stress	Mild	4 (8%)
	Moderate	26 (52%)
	Severe	20 (40%)
Duration of the job stress	Less than 1 month	16 (32%)
	1-6 months	14 (28%)
	6months – 1year	12 (24%)
	More than 1year	8 (16%)

Table 2: Some haematological parameters of control and test subjects

Parameters	**Control (n = 50)**	**Test (n = 50)**	**t**	**P value**
WBC ($\times 10^9$)	5.70 ± 1.17	5.54 ± 1.22	0.661	0.510
Lymphocyte ($\times 10^{12}$)	47.24 ± 6.48	44.04 ± 9.12	2.022	0.462
Monocyte ($\times 10^{12}$)	6.33 ± 1.14	6.40 ± 1.57	-0.266	0.791
Basophil ($\times 10^{12}$)	0.06 ± 0.31	0.30 ± 0.65	-2.361	0.020*
Eosinophil ($\times 10^{12}$)	2.82 ± 1.34	3.30 ± 1.45	-1.724	0.088
Neutrophil ($\times 10^{12}$)	43.46 ± 7.23	46.10 ± 9.24	-1.591	0.115
Haemoglobin (g/l)	138.06 ± 17.67	143.64 ± 26.77	-1.230	0.222
PCV (l/l)	0.42 ± 0.05	0.35 ± 0.41	8.243	0.002*
Platelet ($\times 10^9$)	283.32 ± 78.20	253.48 ± 71.18	1.995	0.049*
ESR (mm/hr)	14.84 ± 11.56	11.02 ± 8.06	1.904	0.060

Values are expressed as n = Number of subjects; WBC = White Blood Cell; PCV = Packed Cell Volume; ESR = Erythrocyte Sedimentation Rate; * = Statistically significant.

Table 3: Some haematological parameters of bankers based on gender

Parameters	Male (n = 25)	Female (n = 25)	t	P value
WBC ($\times 10^9$)	5.68 ± 1.28	5.40 ± 1.15	0.811	0.421
Lymphocyte ($\times 10^{12}$)	44.88 ± 9.59	43.20 ± 0.74	0.047	0.521
Monocyte ($\times 10^{12}$)	6.40 ± 1.68	6.76 ± 1.16	-0.879	0.384
Basophil ($\times 10^{12}$)	0.32 ± 0.69	0.28 ± 0.61	0.217	0.830
Eosinophil ($\times 10^{12}$)	3.12 ± 1.33	3.48 ± 1.56	-0.878	0.384
Neutrophil ($\times 10^{12}$)	45.12 ± 9.66	47.08 ± 8.89	0.746	0.459
Haemoglobin (g/l)	156.50 ± 26.07	130.72 ± 20.87	3.869	0.000*
PCV (l/l)	0.48 ± 0.05	0.40 ± 0.04	3.876	0.000*
Platelet ($\times 10^9$)	248.00 ± 74.45	258.96 ± 68.84	-0.540	0.591
ESR (mm/hr)	9.40 ± 6.63	12.40 ± 9.10	-1.332	0.189

Values are expressed as n = Number of subjects; WBC = White Blood Cell; PCV = Packed Cell Volume; ESR = Erythrocyte Sedimentation Rate; * = Statistically significant.

Table 4: Some haematological parameters of bankers based on age

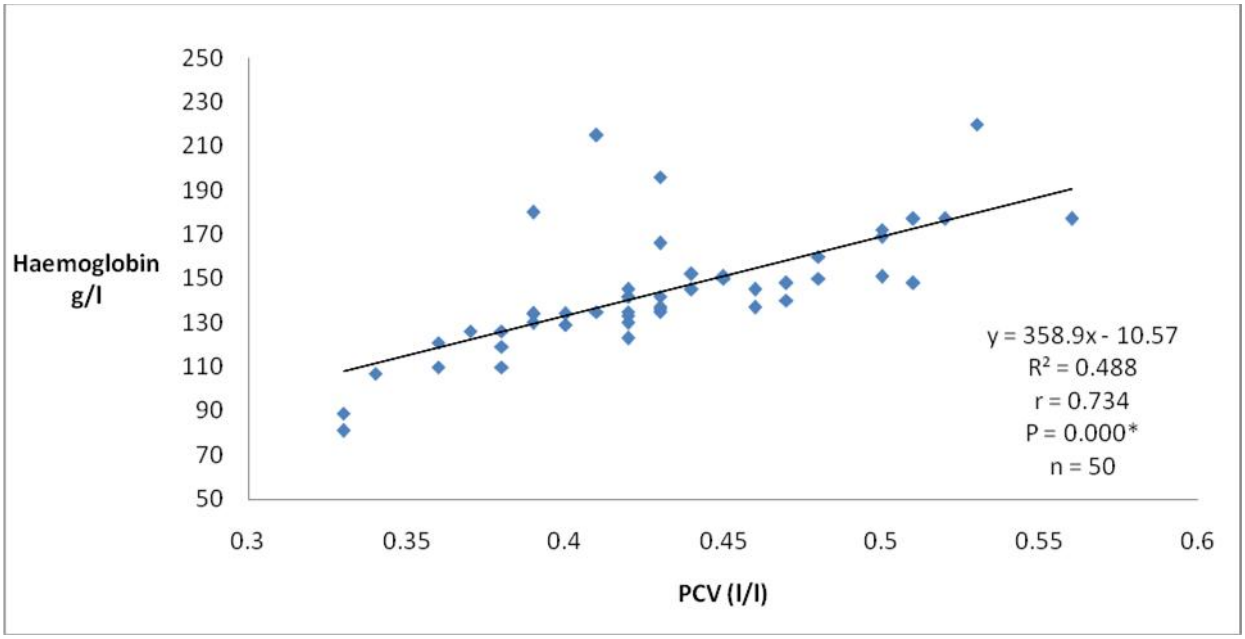
Parameters	21 – 30 years (n = 23)	31 – 40 years (n = 15)	41 – 50 years (n = 9)	> 50 years (n = 3)	F	P value
WBC ($\times 10^9$)	5.35 ± 1.19	5.53 ± 1.06	6.11 ± 1.54	5.33 ± 1.15	0.876	0.460
Lymphocyte ($\times 10^{12}$)	44.17 ± 8.19	41.93 ± 11.87	47.33 ± 7.52	43.67 ± 2.31	0.647	0.589
Monocyte ($\times 10^{12}$)	6.61 ± 1.08	6.47 ± 1.67	6.78 ± 2.11	6.33 ± 0.58	0.113	0.952
Basophil ($\times 10^{12}$)	0.17 ± 0.49	0.40 ± 0.83	0.44 ± 0.73	0.44 ± 0.73	0.548	0.052
Eosinophil ($\times 10^{12}$)	3.35 ± 1.53	3.13 ± 1.36	3.56 ± 1.51	3.00 ± 1.73	0.201	0.985
Neutrophil ($\times 10^{12}$)	45.61 ± 8.51	49.40 ± 11.01	41.44 ± 7.95	47.33 ± 3.21	1.481	0.232
Haemoglobin (g/l)	145.22 ± 23.13	133.93 ± 20.28	150.00 ± 36.19	161.00 ± 46.78	1.297	0.287
PCV (l/l)	0.43 ± 0.05	0.42 ± 0.05	0.45 ± 0.07	0.41 ± 0.01	0.887	0.455
Platelet ($\times 10^9$)	253.91 ± 61.78	251.80 ± 79.39	264.78 ± 94.61	224.67 ± 19.22	0.231	0.874
ESR (mm/hr)	12.26 ± 9.57	8.73 ± 6.82	9.89 ± 5.79	14.33 ± 5.51	0.806	0.497

Values are expressed as n = Number of subjects; WBC = White Blood Cell; PCV = Packed Cell Volume; ESR = Erythrocyte Sedimentation Rate; * = Statistically significant.

Table 5: Some haematological parameters of bankers based on duration of service

Parameters	< 6 years (n = 30)	6 – 10 years (n = 18)	> 10 years (n = 2)`	F	P value
WBC ($\times 10^9$)	5.63 ± 1.33	5.44 ± 1.10	5.00 ± 0.00	0.332	0.719
Lymphocyte ($\times 10^{12}$)	42.47 ± 9.58	45.78 ± 8.20	52.00 ± 4.24	1.570	0.219
Monocyte ($\times 10^{12}$)	6.73 ± 1.28	6.17 ± 1.50	8.00 ± 2.83	1.946	0.154
Basophil ($\times 10^{12}$)	0.40 ± 0.72	0.05 ± 0.24	1.00 ± 1.41	3.051	0.057
Eosinophil ($\times 10^{12}$)	3.43 ± 1.45	3.05 ± 1.26	3.50 ± 3.54	0.394	0.677
Neutrophil ($\times 10^{12}$)	47.50 ± 9.67	44.94 ± 6.24	35.50 ± 3.54	1.864	0.166
Haemoglobin (g/l)	137.37 ± 26.00	152.72 ± 26.18	158.00 ± 29.70	2.172	0.125
PCV (l/l)	0.42 ± 0.05	0.44 ± 0.05	0.50 ± 0.09	2.193	0.123
Platelet ($\times 10^9$)	258.57 ± 73.19	255.67 ± 65.88	158.00 ± 8.49	1.958	0.153
ESR (mm/hr)	9.23 ± 7.31	14.44 ± 8.40	4.00 ± 1.41	3.458	0.040*

Values are expressed as n = Number of subjects; WBC = White Blood Cell; PCV = Packed Cell Volume; ESR = Erythrocyte Sedimentation Rate; * = Statistically significant.



Values are expressed as PCV = Packed Cells Volume
Figure 1: Correlation of haemoglobin and packed cell volume

Discussion

This study was carried out to access and provide adequate information on some haematological parameters of bankers in Calabar Metropolis, and comparing the values gotten with that of non-bankers. Also, to ascertain if gender, age and duration on the job has any significant effect on the measured parameters both clinically and statistically. It was found that there is a significant reduction in the PCV and platelets and an increase in the basophil of the test when compared to the control (non-bankers). (table2). This significant reduction in the PCV and platelet still falls within

the values of the reference range and so anaemia and thrombocytopaenia were not implicated. An increase in basophil known as basophilia can be as a result of autoimmune inflammation or allergy (Mark *et al.*, 2013). Basophilia is also an important marker of leukaemia (Yasuhiro *et al.*, 2017). There was no significant change in the total leucocyte lymphocyte, eosinophil and monocyte, platelet count and haemoglobin concentration (table 2), in contrast to Aswini *et al. (*2016)"the present study showed a significant fall in the lymphocyte count in the stressed individuals while there is a significant rise in the eosinophil and monocyte count. The total leukocyte count, platelet count and hemoglobin levels showed a fall, but were statistically insignificant".

A significant increase was observed in the haemoglobin and packed cell volume of male bankers in comparison to female bankers, (table 3). This agrees with the findings of Jelkmann (2011) and Shahani *et al. (*2009) "The gender related differences in mean venous haemoglobin levels and red cell mass are generally considered to be caused by a direct stimulatory effect of androgen in men in the bone marrow in association with erythropoietin, a stimulatory effect of androgen on erythropoietin production in the kidney, and an inhibitory effect of oestrogen on the bone marrow in women".

During the course of this study a leukaemic sample was encountered. Though this doesn't imply that it is as a result of him working in the bank, and as there is no known cause for leukaemia, there is a possibility that he had been exposed to other risk factors outside his workplace

Conclusion

The study shows that there was a statistical difference among some haematological parameters (basophil, packed cell volume and platelets) of bankers and non- bankers, though not necessarily clinically significant. Gender has shown to influence the packed cell volume and haemoglobin concentration of bankers as physiologically expected. The duration on the job, has only influenced erythrocyte sedimentation rate significantly. The age of bankers has no effect on the haematological parameters of bankers.

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