BLOOD PARAMETERS IN THREE DIFFERENT PROFESSIONALS AND AREAS OF KARACHI

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خلاصہ

خون انسان کے جسمانی عمل میں نمایاں کردار ادا کرتا ہے۔ کسی بھی وجہ سے خون کی گنتی میں تبدیلی انسان کی صحت اور باقاعدہ کاموں کو متاثر کر سکتی ہے۔ اس مطالعے میں تین سائٹس اور تین پیشہ ور افراد یعنی ٹریفک پولیس، سی این جی کارکن، ماہی گیر کا انتخاب لوگوں کے کم، درمیانے، اعلیٰ طرز زندگی اور ماحول کی شدت کے مطابق کیا گیا ہے۔ منتخب کردہ علاقوں سے مختلف پیشہ ور افراد اور جنسی بنیادوں پر خون کے نمونے اکٹھے کئے گئے اور خون کی مکمل جانچ (سی بی سی) کی گئی۔ منتخب علاقوں میں خون کے پیرامیٹرز کا غیر معمولی یکسانیت کا رجحان پایا گیا ہے جو نہ صرف منتخب علاقوں میں مختلف ہے بلکہ اپنی ہی حدود والے علاقے میں بھی مختلف ہے۔ رہائشیوں کی ایک بڑی تعداد کے ساتھ ساتھ مختلف پیشہ ور افراد کے خون کے پیرامیٹرز کی عام اور اوسط قدروں سے کم یا اونچی قیمت کے مالک ہیں۔ خون کے گنتی کے 20 پیرامیٹرز میں سے، 17 پیرامیٹرز کے نتائج غیر معمولی ظاہر کرتے ہیں جس کی وجہ لوگوں کے مختلف طرز زندگی، معاشرے اور ماحولیات ہو سکتے ہیں۔ یہ بھی دیکھا گیا ہے کہ مردوں کے مقابلے میں عورتوں میں خون کے غیر معمول پیرامیٹرز کا ہونا زیادہ پایا گیا ہے۔ لوگوں کی ایک بڑی تعداد نے صفائی ستھرائی اور آلودگی، صحت اور ماحولیات کے میدان میں لاعلمی کھانوں اور غذا کی بے اعتدال اور گنجان آبادی کی وجہ سے تمام علاقوں کی معمولی اقدار سے کم اور اونچائی ظاہر ہو سکتی ہے۔

Abstract

Bloods plays a significant role in the physiology of human being. The change in blood count by any reason can affect the health and regular functions of the human. In this study three sites and three professionals i.e. traffic police, CNG workers, labors of fisheries have been selected according to low, medium and high lifestyle of the people and intensity of environment. The blood samples of different professionals and sex from selected localities were collected and a complete blood count (CBC) was performed. Similar trend of blood parameters in different selected areas were found abnormal whose values not only greatly vary from site to site but also within the site. A large number of residential as well as different occupational people belonging to different localities possess lower and higher value than the normal and average values of blood parameters. Out of 20 parameters, 17 parameters of the blood count show abnormality in results may be due to the different lifestyle, communities and environment of the people. It is shown that in females abnormalities in blood parameters were found more then male. A large number of people showed either lower or higher values than the normal limits due to poor hygiene and sanitation, pollution, unawareness in the field of health and environment, improper consumption of food and diet and dense population.

Key words: Blood Parameters, Professionals, Ambient Air, Blood Count, Air Pollution, Abnormal

Introduction

Human blood comprises various cells such as red blood cells, white blood cells and platelet depending upon their different functions and limits (Ahmed *et al*., 2012). Increase and decrease cell count are the result of various reasons in the body. Any changes in blood count are responsible due to environmental pollution, poor hygiene and sanitation and low life style and standard. Many factors affect the patterns of disease around the world, environmental factors are important among them. Long term effects of air pollution might slightly change the survival curve (aeing) of a population (Tims *et al*., 2006). Health impact of air pollution depends on the pollutants type, its concentration in the airs and length of exposure (Mishra, 2003).

Air pollution is an increasingly important cause of disease and ill health. The major air pollutants includes sulphur dioxide, nitrogen dioxide, ozone, carbon dioxide and etc. Nitrogen Dioxide is a major source of man-made emissions which is produce by the combustion of fossil fuels, particularly by power station and motor vehicles. Nitric oxide reacts with atmospheric oxidants such as ozone to form nitrogen dioxide. Sulphur dioxide is created by burning fossil fuels containing sulphur. Among gaseous pollutants, NOx is most often related to increase hospital admission consultations and emergency departments for myocardial infraction angina or ischemic heart disease (Anne *et al*., 2006). Sulphur dioxide may be further oxidized to sulphur trioxide and sulphuric acid on contact with water. Power station, diesel vehicles, coal burning industrial activities and other

industrial processes are responsible for production of sulphur dioxide. Carbon Monoxide is largely produced due to incomplete combustion processes such as motor vehicles, industrial processes and activities (Tefferi *et al*., 2005). Ozone being a secondary pollutant, being formed by atmospheric photochemical reactions and catalysed by volatile organic compound. High levels of pollution are now relatively rare, Non-fatal effects include temporary changes in lung function, exacerbations of symptoms of chronic bronchitis and asthma, and increase in hospital admissions for respiratory and cardio vascular conditions (Upadhyay *et al*., 2014). In this study individual from traffic police, workers of CNG Stations and fisherman have been selected due to low, medium and high lifestyle of the individual and intensity of environment.

Table. 1. Results of abnormal blood parameters from 03 locations of Karachi.

Areas	RBC	MCV	RDW%	RDWa	HCT	PLT	MPV	WBC	HGB	MCH	MCHC	LYM	GRAN	MID	LYM%	GRA%	MID%
North Nazimabad	35b	61a	186a	3a	83b	44c	52b	92a	77b	53a	94a	10a	21c	2b	17b	9b	1b
Defence	54a	52b	141c	0.1b	125a	84a	85a	95a	101a	35b	36c	8a	28b	0.1c	11c	7b	0.1c
Sohrab Goth	52a	55b	148b	2a	82b	62b	88a	77b	74b	56a	55b	9a	31a	11a	25a	14a	9a
LSD0.05	4.32	3.46	3.46	1.63	3.46	3.99	3.99	3.46	3.46	3.99	5.32	2.83	2.83	1.63	3.46	2.83	1.29

Table. 2. Results Of Abnormal Blood Parameters From 03 Professionals Of Karachi.

Workers	RBC	MCV	RDW%	RDWa	HCT	PLT	MPV	WBC	HGB	MCH	MCHC	LYM	GRAN	MID	LYM%	GRAN%	MID%
Fisheries	42b	45a	168a	10a	82a	91a	61b	62c	72b	30c	48b	5b	10b	1b	10b	3b	0.1b
Traffic Police	55a	49a	160b	0.1a	78b	82b	58b	90a	81a	47b	49b	13a	14a	2ab	16a	8a	0.1b
CNG	37.3c	33.3a	101c	0.1b	70c	48c	68a	75b	66c	67a	86a	10b	17a	4a	11b	5b	1a
F-Values	119.10	2.82	1339.0	73.50	28.0	514.3	334.0	196.3	57.0	514.5	469.0	24.50	12.34	4.07	10.33	9.5	9.72
LSD0.05	2.903	16.77	3.64	2.31	3.99	3.46	3.46	3.46	3.46	2.82	3.46	283	3.46	2.64	3.46	2.83	0.57

Table 3. Permissible Normal Range of Complete Blood Cell of Human Being

S.no.	Parameters	Abbreviation	Normal range
1.	Red Blood Cell	RBC	(3.50 - 5.50) 10 ^{12}/1
2.	Mean Cell Volume	MCV	(75.0 - 100.0) f 1
3.	Red Blood Cell Distribution Width(%)	RDW (%)	(11.0 - 16.0)%
4.	Red Blood Cell Distribution Width (Absolute)	RDWa	(30.0 - 150.0)f 1
5.	Hematocrit	HCT	(35.0 - 55.0) %
6.	Platelet Count	PLT	(100 - 400) 10^3/1
7.	Mean Platelet Volume.	MPV	(8.0 - 11.0) f 1
8.	Platelet Distribution Width	PDW	(0.1 - 99.9) f 1
9.	Platelet Crit	PCT	(0.01 - 9.99) %
10.	Large Platelet Concentration Ratio	LPCR	(0.1 - 99.9) %
11.	White Blood Cell	WBC	(3.5 - 10.0) 10^9/1
12.	Hemoglobin Concentration	HGB	(11.5 - 16.5)g/d 1
13.	Mean Cell Hemoglobin	MCH	(25.0 - 35.0) pg
14.	Mean Cell Hemoglobin Concentration	MCHC	(31.0 - 38.0) g/d 1
15.	Lymphocytes (Absolute)	LYM	(0.5 - 5.0)10^9/1
16.	Granulocytes (Absolute)	GRAN	(1.2 - 8.0) 10^9/1
17.	Mid Cell Population (Absolute)	MID	(0.1 - 1.5)10^9/1
18.	Lymphocytes (%)	LYM(%)	(15.0 - 50.0) %
19.	Granulocytes (%)	GRAN(%)	(35.0 - 80.0) %
20.	Mid Cell Population (%)	MID(%)	(2.0 - 15.0) %

Note: Above or below of the Normal Range of the Complete Blood Cell are considered *(Source:- Hand book of blood Analyzer Medonic M-series Model No. 10548)*
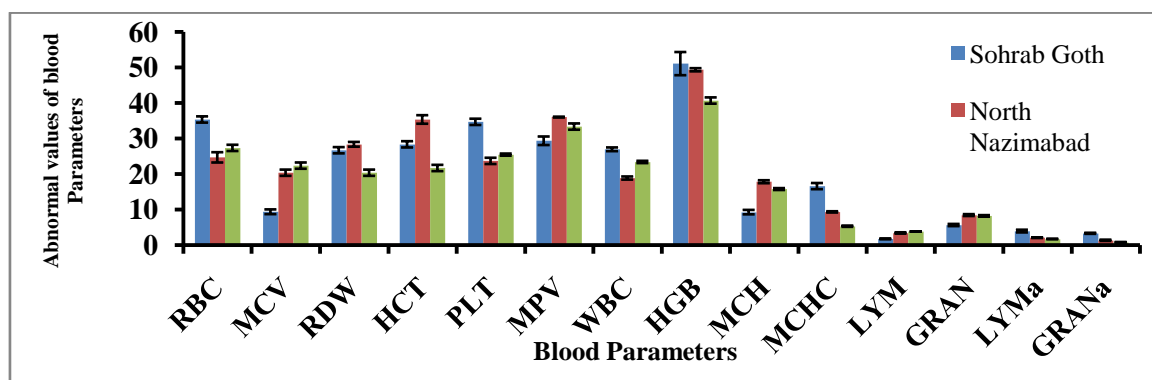

Fig. 1. Mean ± SE of abnormal values of blood Parameters recorded from three different areas of Karachi.
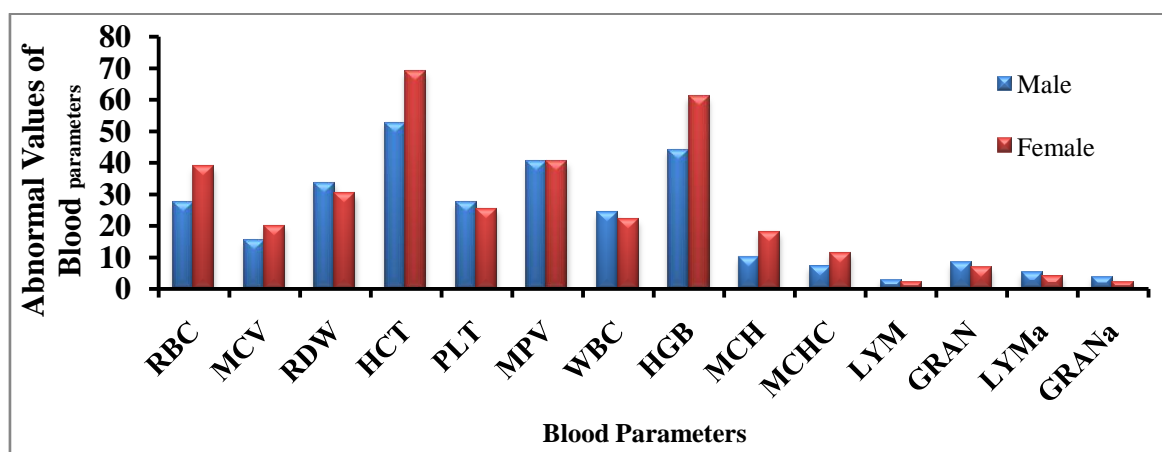

Fig. 2.Overall abnormal values of blood Parameters between male and female patients from three areas of Karachi

Materials and Methods

Three site such as North Nazimabad, Defence, Sohrab Goth while 03 individuals included Fisheries, officials of traffic police, workers of CNG stations of Karachi were selected. Each site has classified according to pollution, infrastructure, lifestyle of people, poverty level density of population, hygiene and sanitation, monthly income and occupation (Ahmed, 2017). The sample includes all age group, professionals and both gender. For the collection of blood samples, a professional compounder was hired. Nearly 300 blood samples were collected from each different locality in a vaccuumated and EDTA.K3 coated tubes, which is free from air, preserve the blood and not allowed to de-clot the blood. These blood samples were placed in a packed ice box and brought to the Dr. Moinuddin Ahmed laboratory Dendrochronology and Plant Ecology of Federal Urdu University of Arts, Science and Technology, Karachi for blood analysis method was followed by (Ahmed *et al.*, 2010). Automatic blood biochemistry analyzer counted the blood samples of 20 parameters and produce a computerized generated report. For the determination of any significant relation between professionals, genders and sites, the Duncan's Multiple Range Test was applied.

Results and Discussions

Table 1 shows results of Duncan's Multiple Range Test of blood samples of 03 different areas of Karachi. Out of twenty parameters of blood samples, seventeen major parameters of the blood samples are either found above or below the permissible limits. The result of Duncan's Multiple Range Test among three different professionals is presented in Table 2 while Table 3 was a normal range of blood particles. Fig 1 explained the overall picture of abnormal blood parameters in three areas regardless of age, sex and professionals. Monthly variation in ambient air quality was explained by (Ahmed *et al.,* 2012) while effect of ambient air quality on human blood was also discussed by (Ahmed *et al.,* 2010).

A. Different localities:-

Defence: In defence 13 parameters of blood were found to be either above or below the permissible limit. Highest value of the parameters of below the normal values for the people is HCT which is 125 leading behind the HGB which is 101 and platelets 75 (Fig. 1D). The locality possess high breeze which has advantage to the pollutants to move towards the sea. The highest abnormal blood count in the area was RDW%. The 17 parameters out of 20 were found either higher or lower than permissible limit in this area.

In Defence, the most abnormal parameters among the sites were mean cell volume width (MCV, 22.33±0.88%), LYM, 3.77±0.03% and GRAN, 8.17±0.22% found in the blood samples of male and female while remaining parameters demonstrated less abnormality (Fig. 1). In Defence 13 parameters of blood (Table 1) were found either above or below the permissible limit. Highest value of the parameters of the individuals which were found below the normal values was HCT which was 125 leading behind the HGB which was 101 and platelets 75. The locality possess high breeze which has advantage to the pollutants to move towards the sea. The highest abnormal blood count in this area was RDW%. The 17 parameters out of 20 were found either lower or higher the permissible limit in this area. The area of North Nazimabad comprising the below or moderate class of the people. The area completely based either on residential and commercial activities. The parameter of RBC, PLT, MPV and GRAN of blood were found below as compared to other two localities while other parameters i.e. MCV, RDW, HCT, HGB, LYM and MID were found slightly higher than two areas. The LYM is significantly similar while RDW%, PLT, MCHC, GRAN, MID, LYM% and MID % were significantly different to each other.

North Nazimabad: The highest abnormal blood count in this area id RDW% which is 186 people leaving behind WBC which is 92 people. In this area 17 parameters out of 20 were found either lower or higher the permissible limit. The results of North Nazimabad showed that four blood parameters out of fourteen showed maximum values (Table 1). The highest abnormal counts were found in hematocrit (HCT, 35.33±1.20%) and mean platelet volume (MPV, 36.9%). The third abnormal blood parameter was red cell distribution width (RDW, 28.33±0.67%) patient blood samples. The MCH also showed highest abnormality with 17.80±0.42%.

Sohrab Goth: The results of the Sohrab Goth showed that female are affected more than male, as 99% of the females blood count found either above or below the permissible limit. Most of the residents have a low daily income and less education. RDW%, PLT, WBC, MCHC, GRAN MID, LYM%, GRAN%, MID% of Sohrab Goth is significantly different from other two areas. In the Sohrab Goth out of fourteen, seven blood parameters showed highest counts among other sites. The haemoglobin (HGB, 51.07±3.27%) showed highest percentage of abnormality in patients. Second highest abnormal blood parameters was Red Blood Cell (RBC, 35.33±0.88%) while Platelets (34.67±0.88%) ranked third. The other important parameters White blood cells (26.93±0.52%),

MCHC (16.57±0.87%), LYMa (3.90±0.38%) and GRANa (3.27±0.15%) also showed highest abnormalities in their counts among areas. The results of the Sohrab Goth showed that females are affected more than males, as 99% of the females blood count found either above or below the permissible limit. Most of the residents have a low daily income and less education. RDW%, PLT, WBC, MCHC, GRAN MID, LYM%, GRAN%, MID% of Sohrab Goth is significantly different from other two areas.

B. Different Professional:-

Fisheries: The highest percentages of abnormalities in blood count were found in fishermen among Traffic Police and workers of CNG stations (Table 2). All fishermen usually prefer to live near and around the fishing area and used old tradition of fishing. Disposal of waste material generated after collecting the fishes from the sea is usually dumped in and around the seaside. Even it is also observed that diesel and petrol spill in the sea from the boat. Also solid waste especially domestic wastes are being deposited on the bank of the river. They lived in unhygienic and vulnerable condition. This area continuously received industrial and domestic waste water which usually contain high COD and BOD. The platelets of the workers of fisheries have below average of blood counting. Out of 20 parameters, 15 parameters of total blood count were found abnormal. Workers attaining age between 20 to 40 years are usually involved in the fishing practices. The MCV, RDWa are not significantly different from Traffic Police and CNG workers.

CNG Workers: It has been noticed and observed that there is no precaution and safety measures are taken by the CNG workers while performing their duty. They usually performs continuously 24 hours duty in the pump in alternate days. Most of the workers are untrained, uneducated and unaware about their health fitness and care. They are directly inhaling various toxic gases which are produced during filling of the cylinder in the cars and even in heavy vehicles. Seventeen parameters of blood particles either found above or lower the permissible limit (Table 2). The WBC of the 70 workers of CNG station was found above the permissible limit. The complete blood count (CBC) trend is different from others professionals such as traffic police and fisheries.

Traffic Police: Traffic Police usually perform their duty from where there is high intensity and flow of vehicles is found. The official timing for their duty for are 8 hours which is generally extended up to 12 to 16 hours in exceptional cases. Some of them used protective measures during their duties while remaining performing their duty without any adopting precautionary measures. These officials didn't have any choice to inhale CO, NOx, NO, NO2 and SO2 which are directly produced from heavy and light vehicles. The WBC of 90 Traffic Police and RBC of 55 were found either above or below the permissible limit of the parameters and comparatively higher than the workers of fisheries and CNG workers (Table 2). The police officials performing their duty are upto the rank of Sub-Inspector comprising the age between 30-50 years.

C. Male to Female Ratio:-

Overall picture of abnormal blood particles in male and female, regardless of area, professionals and age groups are shown in Fig. 2. Here out of seventeen only fourteen blood parameters were considered important. In our study higher numbers of patients with abnormal parameters were not necessarily recorded from highly polluted, higher traffic or industrial density or poor population. According to (Rao *et al.,*2011) individual from higher socio-economic class are more educated and health conscious consumed mostly junk food having low nutritional values. Therefore, they equally showed abnormalities in blood parameters like individuals of poor socioeconomic class living in poor environment. But due to more health conscious they visit to the doctor in early stage of sickness. In addition, since these abnormalities were recorded from people suffering with different diseases and infections, these abnormalities may also be due to these diseases and infections. Therefore, blood samples were also analyzed by using healthy man of three (03) different individuals i.e. Fisherman, Traffic Police and Workers of CNG station.

The overall conditions of western countries are different from the eastern countries especially in Pakistan, due to these conditions hematological reference values vary in different populations of world as well as in different gender and in different age groups. Study by world health organization showed that variation in particular physiologic requirements of person's were due to the age, gender, tobacco usage and different pregnancy stages. These were the casual agents of abnormal blood count reference ranges. In this study status of diseases and infections were not assessed and no medical or laboratory tests were conducted.

It is concluded that high numbers of females showed in HCT, HGB and MCH blood parameters. It may also conclude that surrounding may not affect on the counts of blood parameters. Though present investigation had some limitations, therefore this study should be considered as primary investigation and more detailed studies are suggested. Social habits like drug taking, smoking and dietary components were not recorded. Blood sample were not taken same time of the day or in same season, age and ethnic group.

Out of 20 parameters of total blood count, 17 major parameters of total blood count were found abnormal which showed evidence that the people of Karachi have no choice to live in such chronic and alarming condition. This is because of human activities that change the atmosphere's composition e.g. through burning fossil fuels, industrial production etc. These human activities increase the amount of green house gases in the atmosphere which keeps more heat in the atmosphere facilitating global warming. (Rao, 2013) and (Ahmed *et al.,* 2012) also found the same from Karachi residence.

It is also noticed that there is no safety and precautionary measures taken by any professionals which are responsible to enhance the abnormality of blood count. The main components of blood particles such as RBC, WBC and PLT were found higher number in the abnormality among the professionals and populations. The study also reveal that female have more percentage of abnormal blood count as compared to male, although all the female holding house/home activity, even below 20 years age were also affected and found abnormality of blood count. Industrial and vehicular emissions directly affected the professional and population. (Rao, 2013) and (Ahmed *et al.,* 2012) also found the same in their studies in population of Karachi. The workers and professionals usually feel vomiting, dizziness, headache rapid breathing, mental confusion, fatigue, coughing and choking. More specifically, ischemic heart diseases appear to be associated with urban atmosphere pollution in terms of mortality and morbidity (Schwartz, 1994). Most of the industrial and commercial unit also installed oil and gas based generators produce NOx, NO, NO2, SO2 and CO. CO which binds very strongly to haemoglobin to form carboxyhaemoglobin, reduces the capacity of haemoglobin to transport oxygen and to deliver it to peripheral tissues, thus contributing to tissue hypoxia. It may also lead to the production of oxidizing agents (Anne *et al.*, 2006). There is no routine mechanism to check the efficiency and fitness of these generators. Oil based generators are more toxic than gas based generator. Manure and open dumping of garbage containing full of organic matter (things like food scraps, newspaper, leaves), every new garbage comes and pilled over the old garbage creating methane gas in the absence of aerobic condition. The overall scientific objective of the analysis was to estimate the relative change in the rate of mortality associated with changes in air quality variables, controlling for variation in weather and other potential confounding factors (Samet *et al.*, 1995). Chronic exposure to current outdoor air pollution levels, to which road traffic emissions are a major contributor, may have even larger impacts on mortality than acute exposure (Ravi *et al.*, 2005).

Conclusion

It is concluded that complete blood count (CBC) is one of the most common, easy and accessible tests for common people. It includes 20 blood parameters having different mechanisms and functions in human being. According to Brain (1996) upto 5% of the general people without any disease may also show values of above or lower abnormality in blood cells than normal blood count. During CBC interpretation, race should also be considered. The abnormalities in blood particles were found more in females than males. Out of 20 parameters of the total blood count, 17 major parameters of total blood count were found abnormal which showed evidence that people being living in such chronic and alarming condition. Both long and short term exposure were responsible in the variation of the physiology of the human being. Locality such as Defence, North Nazimabad and Sohrab Goth has been classified on the basis of their life style and standard of living of the people, Traffic flow, infrastructure, education, environmental concentration and sanitation found no difference between air pollution, abnormalities in blood count which were responsible to effect the human health of the resident. Further it is also concluded that no safety or precaution measures has been adopted by any individuals except few Traffic Police by wearing only nose mask and hence they have no choice to inhale polluted air, directly either produced from anthropogenic activities or natural processes. However, this study should be considered preliminary therefore more detailed investigation is suggested.

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