THE EFFECT OF AIR POLLUTION ON HUMAN BLOOD

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ABSTRACT

The present investigations indicate that air pollution is associated with several chronic diseases. A prospective study was conducted to investigate changes in blood parameters in response to daily changes in air pollution in Karachi city. Several clinical visits were scheduled and blood parameters were measured in 64 males and 16 females during 2008-2009. Eighty samples of blood were collected from different areas of Karachi, classified on the basis of pollution such as highly polluted areas, moderate polluted and less polluted areas. The preliminary results suggested that air pollution is associated with several blood parameters which may cause unceasing diseases.

INTRODUCTION

Over the last few decades there has been increasing global concern over the public health impacts attributed to environmental pollution, in particular the global burden of disease. Blood is a specialized bodily fluid that transports necessary substances to the body's cells such as nutrients, oxygen and helps to excrete waste products from body. The blood mainly consists of two parts, the blood cells and plasma. Blood cells constitute 45% of the whole blood mainly consists of red blood cells and 55% of blood is plasma. Blood accounts for 8% of the human body weight; one micro-liter of blood contains 4.7 to 6.1 million (male), 4.2 to 5.4 million (female) erythrocytes.

The World Health Organization (WHO) estimates that about a quarter of the human diseases occur due to prolonged exposure to environmental pollution- heavy metals present in both natural and contaminated environments. These elements were present at higher concentrations in polluted environments compared with natural environment. The elements that are of concern include lead, mercury, cadmium, arsenic, chromium, zinc, nickel and copper. Heavy metals released into the environment from metal smelting and refining industries, scrap metal, plastic and rubber industries, various consumer products and from burning of waste containing these elements. These elements travel for large distances and are deposited onto the soil, vegetation and water depending on their density. Once deposited, these metals are not degraded and persist in the environment for many years poisoning humans through inhalation, ingestion and skin absorption. Major kinds and sources of pollution includes dust, smoke, fumes, fog and major pollutants such as carbon dioxide, Carbon monoxide, Nitrogen dioxide and sulphur dioxide which directly affect the human health and change the physiology of the body.

Dust (flying ash) and bottom ash are the main components of the environment pollution, which results from the industrial sector. These components contain elements with high toxic potential such as: Pb, Cd, As, Be and Hg (Daci *et al.,* 1996 and Zeneli *et al*., 2008). The high levels of lead are negatively impacting on the communities living near the dumpsite turn to lead clinical symptoms such as headaches, chest pains and muscular weakness being manifested in the children (Personal communication with doctors).

Karachi holds vast industrial commercial and trading areas. The overall population of Karachi is 20 millions. Different kinds of gases/smoke emission by automobiles and industries, dust mites from dusty wind in summer time spread garbage and industrial wastes on open ground encourage heavy toxic pollution. Concerns about the adverse effects of pollution on human blood are important determinants of environmental and public health policies. The present research is designed to monitor the health conditions of the people working under extreme polluted environment.

MATERIALS AND METHODS

A preliminary study based on procuring blood samples and questionnaire (included questions regarding age, nature of work, residential area, length of service, duration of work, disease, (if any) to examine the effect of blood in response to the pollution in Karachi city. After analysis of 20 parameters of blood by Blood Analyzer Medonic M-series Model No. 10548 report was sent to the concerned person (whose report is unsatisfactory) they are advised

to consult the physician and also take necessary treatment and precautionary measurement. This research was undertaken to investigate a link between blood and air quality. Different areas were selected for this investigation on the basis of intensity of pollution (highly, moderated or less), congested population, lifestyle of the people and hygienic situation of the area. Eighty samples were collected from various localities of Karachi during 2008-2009. Out of which 46 samples were collected from worker of CNG and Petrol pump workers whereas other samples were collected from high traffic areas Sohrab Goth, Gulberg, North Karachi, Defence and Gulshan-e-Maymar.

RESULT AND DISCUSSION

Results of blood are given in table 1 to 4. The study population consisted of 64 men, and 16 females-ages ranging between aged 13 to 56 years. The characteristics (age and sex) of the inhabitants are also presented in the tables. 34 samples which were collected from different areas such as highly polluted, moderate polluted and less polluted areas shows unsatisfactory results. The RBC of 3 workers found high, WBC of 2 workers found high, PLT of 2 workers of low. MPV of the 11 workers found low. All samples of the blood not come under given normal range either it is below or high. The RBC of 13 peoples found out of range, the WBC of 13 peoples also found either below the range or above the range. The most effective parameter which is affected, found in the blood samples are HCT%, PLT, MPV and HGB. 26 of HCT%, 17 of PLT, 24 of MPV and 22 of HGB of different people found either above or below the given normal range.

In general low Hemoglobin (HGB) and Hematocrit (HCT) was much common than other abnormalities. It indicates that anemia is high among studied areas. Higher White Blood Cells (WBCs) indicative of allergy and high rate of infections. Another blood parameter Red Blood Cells Distribution Width (RDW) was obtained in higher than the normal range. RDW is a numerical measure of anisocytosis. It may be useful in distinguishing certain causes of anaemia, in particular, in distinguishing Iron Deficiency (RDW raised) from Thalassaemia (RDW usually normal) and in distinguishing Megaloblastic Anaemia (RDW usually raised) and other causes of macrocytosis.

The Total Platelet Count (PLT) and four other blood parameters such as Mean Platelet Volume (MPV), Platelet Distribution Width (PWD), (PCT) and Large Platelet concentration Ratio (LPCR) are related to the Platelet. The abnormal values of these parameters showed that the blood might be infected by various diseases and infections. The main effect of a reduced platelet count is an increased risk of bleeding, hemorrhage or bruises (ecchymoses) following minor trauma, sometimes threatening sight.

The normal values of the blood parameters recorded from most of the localities due to the interaction of the various factors such as place of living, age, time period, working place and the nature of the work. It may be possible that the persons having normal blood were the newly inhabitants whereas the person contained abnormal blood parameters were the older residents of these areas; they all were young so that they have high resistance to fight against pollutant and diseases.

CONCLUSION

These results suggest that elevated concentrations of air pollution are associated with changes in some blood parameters which may cause chronic pulmonary disease (Aymerich *et al*., 2000 and Schikowski *et al.,* 2007), increased risk of cardiovascular death in cardiovascular patients (Mills *et al*., 2009). Our findings need further investigation.

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Table 1. Blood Sampling Sheet CNG AND PETROL PUMP WORKERS.

No. of Persons	Sex	Age	RBK 10⁶/L	MCV FL	RDW %	RDWa FL	HCT %	PLT 10⁶/L	MPV FL	PDW FL	PCT %	LPCR %	WBK 10⁹/L	HGB g/dl	MCH pg	MCHC g/dl	LYM 10⁹/L	GRAN 10⁹/L	MID 10⁹/L	LYM %	GRAN %	MID %
1	M	14	4.7	83	14	63	40.1	175	9.2	12.2	0.16	24.9	9.2	14.4	30.2	36	1.9	6.7	0.6	20.7	73.5	5.8
2	M	35	4.5	90.4	15.9	74.8	40.8	250	8.7	11.4	0.21	21.3	13.6#	14.8	32.9	37.2	4.0	8.5	1.1	29.1	62.2	8.1
3	M	21	4.75	76.4	14.8	57.1	36.3	207	8.0	10.2	0.16	17.1	6.3	13.5	28.5	37.2	2.4	3.4	0.5	39.0	54.1	6.9
4	M	17	4.88	77.9	15.1	59.4	38.1	253	7.8*	10.2	0.19	15.5	8.6	14.0	29.7	36.8	2.9	4.9	0.8	34.7	57.5	7.8
5	M	19	4.61	80.2	15.0	61.7	37.0	223	8.3	10.8	0.18	18.0	7.4	13.7	27.8	37.0	2.2	4.6	0.6	30.6	62.7	6.7
6	M	27	4.99	77.0	15.4	59.8	38.4	360	7.8*	10.2	0.28	15.3	8.2	13.9	29.1	36.1	3.0	4.5	0.7	36.6	54.9	8.5
7	M	33	4.52	74.4	14.3	54.2	33.6	153	7.9*	10.3	0.12	15.8	7.4	13.1	29.1	39.1	1.9	5.0	0.5	26.5	67.0	6.5
8	M	57	4.59	81.3	15.3	63.2	37.3	195	8.4	11.2	0.16	20.1	9.9	13.7	29.9	36.8	3.1	6.1	0.7	31.2	61.7	7.1
9	M	35	5.09	78.9	15.1	60.6	40.2	236	7.7*	10.2	0.18	14.2	6.4	13.9	27.4	34.7	2.2	3.7	0.5	34.3	59.2	6.5
10	M	18	4.59	76.3	17.1#	62.9	35.0	150	9.1	12.1	0.13	24.4	7.8	12.0	26.2	34.3	3.7	3.4	0.7	47.3	43.9	8.8
11	M	18	4.99	79.8	14.7	60.3	39.9	212	7.9*	10.5	0.16	16.4	6.0	14.5	29.0	36.3	2.4	2.9	0.7	41.3	48.1	10.6
12	M	18	4.36	80.0	14.7	60.5	34.9*	212	7.0*	9.3	0.14	11.0	6.2	12.5	28.7	35.9	1.9	3.8	0.5	31.1	61.8	7.1
13	M	28	5.08	79.1	15.8	62.7	40.2	139	8.2	11.2	0.11	19.0	4.6	14.3	28.2	35.7	1.8	2.3	0.5	40.4	49.7	9.9
14	M	22	5.01	78.4	15.4	60.7	39.3	117	9.4	13.1	0.11	27.3	8.9	13.9	27.7	35.4	2.5	5.7	0.7	28.0	64.2	7.8
15	M	31	4.51	84.5	14.6	65.3	38.1	180	9.0	12.5	0.13	23.9	10.2#	13.7	30.4	36.0	3.4	6.0	0.8	33.8	59.2	7.0
16	M	16	4.78	82.9	15.3	65.2	39.7	193	8.5	11.3	0.16	21.9	6.9	14.0	29.4	35.4	2.4	3.9	0.6	35.4	57.2	7.4
17	M	13	4.29	76.7	14.4	56.2	32.9*	243	8.5	11.3	0.2	20.6	7.1	12.0	28.0	36.5	2.6	4.0	0.5	36.3	55.7	8.0
18	M	63	4.52	82.5	14.8	63.3	37.3	201	8.5	11.5	0.17	21.7	7.0	13.8	30.6	37.0	1.6	4.9	0.5	22.7	69.5	7.8
19	M	26	4.58	84.0	14.7	64.9	38.5	42*	8.5	11.5	0.03	21.9	3.5	13.6	29.8	35.5	1.3	2.0	0.2	36.3	55.8	7.9
20	M	21	5.25	77.5	15.3	60.0	40.7	242	8.1	10.7	0.19	17.8	10.3#	14.8	28.3	36.5	1.5	6.9	0.9	24.6	36.3	7.9

Table 2. BLOOD SAMPLING SHEET OF CNG AND PETROL PUMP WORKERS.

No. of Persons	Sex	Age	RBC 10¹²/L	MCV FL	RDW %	RDWa Fl	HCT %	PLT 10⁹/L	MPV FL	PDW FL	PCT %	LPC R %	WBC C 10⁹/L	HGB g/dl	MCH pg	MCHC g/dl	LYM 10⁹/L	GRAN 10⁹/L	MID 10⁹/L	LYM %	GRAN %	MID %
21	M	25	4.66	83.5	15.1	65.1	38.9	164	8.9	11.8	0.14	23.3	4.8	13.6	29.1	34.8	1.4	3.1	0.3	29.3	63.6	7.1
22	M	21	4.45	85.0	15.8	69.3	37.8	187	8.0	10.6	0.15	17.8	7.9	13.4	30.2	35.6	4.0	3.0	0.9	50.7	38.7	10.6
23	M	13	4.72	75.9	15.8	59.2	35.9	156	7.9*	10.6	0.12	17.1	4.9	12.9	27.3	35.7	2.6#	1.9	0.4	52.9	38.7	8.7
24	M	32	4.76	80.1	15.1	62.0	38.2	53*	8.6	12.2	0.04	23.2	5.2	13.2	27.8	34.7	1.6	3.2	0.4	31.8	61.2	7.0
25	M	23	5.63#	78.3	14.9	59.8	44.1	186	7.9*	10.5	0.14	15.7	5.4	16.1	28.6	36.6	1.7	3.2	0.5	32.6	59.4	8.0
26	M	20	4.18	88.9	187.*	77.5	37.1	343	7.2	9.4	0.25	11.3	9.5	13.1	31.5	35.4	2.9	5.8	0.8	30.2	61.1	8.7
27	M	30	5.36	80.9	15.4	64.2	43.4	235	8.9	12.1	0.21	23.4	9.8	15.6	29.0	35.9	3.0	5.8	1.0	31.0	59.7	9.3
28	M	40	5.36	77.5	15.0	58.5	41.5	223	8.5	11.4	0.23	20.4	8.8	15.4	28.8	37.2	2.6	5.4	0.8	35.6	61.4	8.6
29	M	33	4.98	78.8	14.6	60.1	39.2	293	8.0	10.6	0.23	17.1	8.2	14.3	28.8	36.5	3.1	5.0	0.6	35.6	57.3	7.1
30	M	24	3.79	88.3	14.5	68.5	33.5*	139	9.8	13.0	0.13	26.9	5.6	11.9	31.4	35.5	1.6	3.4	0.6	29.7	60.3	10.0
31	M	40	6.95#	67.2*	16.4#	52.5	46.7	191	8.3	11.0	0.15	17.7	7.9	16.2	23.2#	34.6	2.0	5.1	0.8	26.2	65.3	8.5
32	M	30	3.70	87.7	14.3	67.2	32.4	159	8.6	11.2	0.13	18.2	5.6	11.6	31.4	35.8	2.2	2.9	0.5	39.2	52.8	8.0
33	M	28	5.54#	71.3#	16.2*	56.1	39.5	193	8.6	11.4	0.16	20.9	7.4	14.6	26.4	37.1	1.6	5.3	0.5	22.3	72.4	5.3
34	M	35	5.24	80.0	15.3	62.6	41.9	209	9.6	12.9	0.20	27.4	8.2	15.7	30.1	37.6	3.6	3.9	0.7	43.8	47.4	8.8
35	M	20	5.44	82.4	16.3*	67.5	44.9	223	7.3*	9.8	0.16	13.0	8.6	15.9	29.2	35.4	3.1	5.0	0.5	35.8	58.1	6.1
36	M	21	5.20	75.7	15.2	59.4	39.4	232	7.2*	10.1	0.18	13.9	8.9	14.0	26.9	35.5	3.3	4.8	0.8	37.7	53.6	8.7
37	M	22	5.02	82.6	15.0	64.3	41.5	245	7.8*	10.3	01.9	16.1	8.2	15.1	30.1	36.4	3.1	4.4	0.7	37.2	54.3	8.0
38	M	25	5.09	82.6	15.3	65.4	42.0	193	8.5	11.0	0.16	19.0	8.5	14.9	29.3	350.4	2.5	5.0	1.0	30.4	59.4	10
39	M	21	4.61	82.6	14.6	63.3	38.1	218	7.7*	10.0	0.16	14.7	6.1	13.8	30.0	36.3	1.8	3.9	0.4	29.2	63.8	7.0
40	M	56	5.25	78.6	15.8	62.6	41.3	201	8.3	10.9	0.16	17.8	8.0	15.0	28.7	36.4	1.7	5.6	0.7	21.4	70.8	7.8

Table 3. BLOOD SAMPLING SHEET OF CNG/PETROL PUMP WORKERS GULBERG, DEFENCE.

No. of Persons	Sex	Age	RBC 10¹²/L	MCV FL	RDW %	RDW_a FL	HCT %	PLT 10⁹/L	MPV FL	PDW FL	PCT %	LPR %	WBC 10⁹/l	HGB g/dl	MCH pg	MCHC g/dl	LYM 10⁹/L	GRAN 10⁹/L	MID 10⁹/L	LYM %	GRAN %	MID %
41	M	20	4.18	89.2	15.2	73.1	37.3	23.5	7.9*	10.3	0.18	15.2	7.9	13.3	31.9	35.7	2.6	4.6	0.7	33.2	58.4	8.4
42	M	18	5.16	73.9*	15.7	57.2	38.2	269	7.8*	10.2	021	15.2	5.3	13.3	25.8	34.9	2.4	7.7	0.7	22.4	71.6	6.0
43	M	26	4.09	74.3*	16.8#	60.9	30.4*	230	8.4	11.0	0.19	18.8	5.3	11.1*	27.1	36.5	1.8	3.0	0.5	35.4	56.7	7.9
44	M	20	4.97	81.1	15.6	65.3	40.3	161	10.1	14.2	0.16	32.7	7.2	14.3	28.8	35.5	2.5	4.2	0.5	34.6	58.5	6.9
45	F	23	4.84	76.7	16.3#	62.4	37.2	283	9.0	12.0	0.25	23.6	6.8	12.4	25.6	33.4	4.4	6.4	1.0	37.8	54.3	7.9
46	F	58	4.66	95.9	19.7#	92.9	44.8	162	8.8	11.9	0.14	22.8	6.8	17.2#	36.8*	38.4#	2.1	4.1	0.6	31.6	60.2	8.2
47	F	47	5.26	66.9*	18.7	57.4	35.2	223	9.3	12.4	0.20	26.5	7.4	12.1	23.1*	34.6	1.8	5.1	0.5	24.7	68.6	6.7
48	F	19	5.36	65.6*	17.9#	53.9	35.1	305	8.4	11.3	0.25	20.7	7.7	11.8	22.1	33.6	3.0	3.9	0.8	40.1	50.9	9.0
49	M	47	3.68	86.8	16.4#	6902	32*	1042#	9.0	11.7	0.93	22.0	4.5	10.1*	27.4	31.6	1.6	2.5	0.4	37.1	56.1	6.8
50	F	41	3.81	92.8	16.5#	80.3	35.4	154	8.3	11.2	0.12	21.1	7.3	12.5	32.9	35.4	2.4	4.1	0.8	33.8	57.4	8.8
51	M	42	4.09	84.8	14.3	63.5	34.7*	80*	7.9*	10.4	0.06	16.1	2.1*	12.1	29.7	35.1	0.8	1.0*	0.3	40.2	50.8	9.0
52	M	39	4.93	80.7	16.4#	66.7	39.8	67*	10.1	13.5	0.06	28.1	5.5	13.7	27.9	34.5	1.2	3.9	0.4	22.7	71.2	6.1
53	F	37	3.30*	79.5	14.4	59.2	26.2*	145	8.7	11.5	0.12	20.1	6.1	9.8*	29.7	37.4	2.0	3.6	0.5	32.7	59.7	7.6
54	M	23	4.12	79	17.4#	66.5	32.6*	594#	9.3	12.8	0.55	26	8.0	10.6*	25.9	32.7	2.0	5.4	0.6	26.1	68.1	5.8
55	F	18	4.97	81.8	14.3	60.5	40.7	148	7.5*	10.1	0.11	15.2	5.3	14.7	29.5	36.0	3.5	4.2	11.2	43.6	60.2	7.6
56	M	38	2.16*	86.9	15.6	70.0	18.8*	82*	11.6#	16.3	0.09	40.0	506	6.7*	31.1	35.8	1.0	4.0	0.6	19.5	71.4	9.1
57	F	35	3.18*	76.3	14.5	55.5	24.3*	198	8.5	11.3	0.16	20.8	9.0	9.1*	28.7	37.6	4.5	5.6	1.3	20.1	60.0	7.6
58	M	36	3.88	78.2	17.7#	69.1	30.3*	111	8.7	11.3	0.09	20.8	3.7	10.1*	26.1	33.3	1.0	2.5	0.2	26.8	66.2	7.0
58	M	42	3.41*	82.1	15.8	67.0	28.0*	92*	7.5*	10.2	0.06	14.9	3.5	9.9*	26.9	35.2	0.7	2.6	0.2	20.9	74.2	4.9
60	M	35	3.52	81.3	17.7#	71.3	28.7*	89*	7.7*	10.3	0.06	15.4	2.2*	10.2#	29.0	35.6	0.8	1.1*	0.3	40.5	53.7	5.8

Table 4. BLOOD SAMPLING SHEET OF THE RESIDENTS OF NORTH KARACHI, GULBERG, DEFENCE, GULSHAN-E-HADEED.

No. of Persons	Sex	Age	RBC 10^{12}/L	MCV FL	RDW %	RDWa FL	HCT %	PLT 10^9/L	MPV FL	PDW FL	PCT %	LPCR %	WBC 10^9/L	HGB g/dl	MCH pg	MCHC g/dl	LYM 10^9/L	GRAN 10^9/L	MID 10^9/L	LYM %	GRAN %	MID %
61	M	32	7.51#	76.3	16.18	69.0	57.3#	95*	8.1	10.9	0.07	19.2	14.6#	20.2	26.9	35.2	4.0	9.6#	1.0	27.4	65.8	6.8
62	M	37	3.05*	70.0*	15.4	52.9	21.3*	41*	8.3	10.7	0.03	21.1	3.3*	7.6*	25.2	36.0	0.5	2.7	0.1	14.9*	80.8#	4.3
63	M	22	2.32*	73.2*	16.9#	60.8	16.9#	102	7.9*	10.5	0.08	16.6	5.0	6.4*	27.7	37.9	1.9	2.7	0.4	38.4	54.6	7.0
64	F	26	3.96	79.0	14.3	57.7	31.3*	69*	8.4	11.3	0.05	19.8	2.9*	11.6	29.2	37.0	0.8	1.8	0.3	30	63	6.7
65	F	29	4.83	81.5	14.6	61.7	39.4	92*	6.8*	9.1	0.06	9.5	4.3	14.4	29.7	36.5	0.8	3.2	0.3	19.3	75.9	4.8
66	M	42	3.58	67.7*	18.8#	58.4	24.2*	244	7.2*	9.6	0.17	13.7	7.6	8.2*	23.0*	34.0	2.1	5.0	0.5	27.8	66.1	6.1
67	M	34	4.51	83.2	15.4	65.8	37.5	129	7.9*	10.5	0.10	16.3	10.0	13.1	29.1	35	2.5	6.7	0.8	25.5	67.2	7.3
68	M	41	3.19*	76.3	15.9	59.7	24.3*	80*	7.5*	10.1	0.06	15.1	6.1	8.7*	27.5	36.0	1.1	4.6	0.4	18.5	76.7	4.8
69	M	24	3.65	88.3	15.4	71.5	32.3*	40*	9.8	14.2	0.03	34.2	1.6*	11.1*	30.5	634.6	0.3*	1.1*	0.2	22.9	70.4	6.7
70	M	28	4.02	92.1	16.0	78.8	37.1	2.66	7.2*	10.2	0.20	15.0	17.5*	12.6	31.4	34.0	1.0	16.2#	0.3	5.7*	92.3*	2.0
71	M	27	2.82*	77.7	18.3#	69.4	21.9*	37*	8.6	12.2	0.03	21.8	2.0*	7.9*	28.0	36.1	0.7	1.1*	0.2	27.1	60.8	12.1
72	M	34	3.53	75.6	17.6#	65.1	26.7*	94*	7.7*	10.1	0.07	17.1	8.3	9.4*	26.3	35.5	2.2	5.1	1.0	36.1	54.8	9.1
73	M	29	4.7	75.2	17.4*	63.6	35.3	75*	7.9*	10.7	0.05	19.2	5.9	12.3	26.2	34.9	1.3	4.1	0.5	23.2	69.2	7.6
74	F	21	3.28*	83.4	14.9	65.2	22.4*	209	7.7*	10.2	0.16	14.9	5.0	9.5*	28.2	34.6	2.0	2.6	0.4	41.6	52.2	6.2
75	M	36	3.40*	80.1	15.4	63.3	27.2*	75*	8.1	10.8	0.15	18.1	2.8*	9.9	29.2	36.5	0.7	1.8	0.3	25.7	67.3	7.0
76	F	15	3.90	77.7	15.9	61.5	30.3*	196	7.9*	10.2	0.06	14.8	6.3	11.0*	28.1	36.2	1.0	5.0	0.3	16.0	79.4	4.6
77	M	25	4.26	84.0	17.4#	71.7	10.6*	46*	9.1	12.2	0.04	23.2	1.9*	5.3*	42.4#	50.5#	0.6	1.2	0.1	31.2	61.8	7.0
78	M	29	4.09	77.2	16.1#	61.6	31.6*	116	7.5*	10.1	0.08	15.1	3.6	11.3*	27.7	35.9	1.3	1.9	0.4	36.5	53.8	9.7
79	F	35	2.88*	77.6	16.0	60.4	22.4*	136	6.7*	8.9	0.09	8.7	8.1	8.1*	28.2	36.4	1.8	5.8	0.5	23	71.8	5.2
80	M	34	3.87	84.4	15.3	67.4	32.6*	102	7.7*	10.1	0.07	15.9	2.4*	12.0	31.1	36.8	0.8	1.4	0.2	33.3	60.0	6.7

Note: * = Value lower than the normal range.   # = Value higher than the normal range.

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