Pattern of lipid profile in patients attending metabolic clinic in Oghara, Delta State, Nigeria

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Abstract

Owing to its high prevalence, dyslipidemia is rapidly becoming a major public heart issue worldwide, and especially in Nigeria. Although it is a preventable significant risk factor for coronary heart disease, it is a common leading cause of death in Nigeria. The study therefore investigated the lipid profiles of patients attending Metabolic Clinic at the Delta State University Teaching Hospital (DELSUTH). A total of 713 participants were recruited for the study. Blood samples (5mls) were collected via venipuncture from each of the participants and distributed into tubes containing EDTA and fluoride oxalate. A spectrophotometer was used to conduct the lipid analysis, and the normal operating assay protocol was followed. Results showed total cholesterol in the male (194.6 mg/dL) were generally lower than in the females, particularly for participants below the age of 40. However, as the ages progressed (that is, above 40 years), total cholesterol in males became higher than those in the females. Antherogenic ratio as well as antherogenic index of plasma were higher in the female gender at ages below 40 years. The study showed that the risk of hypercholesterolemia may be higher within the active age period of 30-60 years. As seen in the current study, plasma lipid levels change drastically by sexual development or maturity, and the trends vary by age and sex. The study also significantly demonstrated the elevated lipids levels in younger women in the study population than older men. When assessing screening and diagnostic criteria for classifying individuals with elevated blood lipid levels, pubertal or sexual growth may be taken into account.

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Introduction

Lipid metabolism, including phospholipids and cholesterol for cell membrane formation, offers important building blocks for cell proliferation. Since lipids are insoluble in plasma, they are bound to lipoproteins and transferred to different tissues, where they are used for a number of functions such as energy metabolism, steroid hormone synthesis, and bile acid formation. Lipids have many functions in the body, including serving as chemical messengers, energy storage and delivery. A variety of factors that activate sterol regulatory element binding proteins may Stimulate Intracellular Lipid Synthesis (SREBP). As part of the lipoprotein particles, fats such as cholesterol and triglycerides are taken through the bloodstream. It has consistently been shown that serum cholesterol (and therefore LDL cholesterol) is a significant risk factor for Cardiovascular Disease (CVD) and other major cardiovascular diseases.[1-5]

Owing to its high prevalence, dyslipidemia is rapidly becoming a major public heart issue worldwide, and especially in Nigeria. Although it is a preventable significant risk factor for coronary heart disease, it is a common leading cause of death in Nigeria.[2-4] The relationship is continuous, graded, solid, predictive, independent of other risk factors and generally assessed as linked to causation. Where other risk factors are present concurrently, the effect of cholesterol on the risk of CVD is increased. Cholesterol is a risk factor for getting the first heart attack. It tends to be very effective in predicting a repeated occurrence.[6-8]

CVDs are the leading cause of death worldwide, with rates of CVD-related death increasing rapidly in Nigeria[2] and other low- and middle-income countries. Nigeria can be assumed to have been in the first stage in the previous 50 years, as much of the cardiovascular disease presentations were attributed to malnutrition and communicable diseases. The most popular CVDs at the time were rheumatic heart disease and cardiomyopathies; these are significantly linked to dyslipidemia.[2] Lipid levels have historically been documented to be a risk factor for CVD in patients, but the degree to which this association between lipid levels and CVD exists varies from person to person.[1,3,5,7,8] Therefore, the purpose of the study is to present the lipid profile of patients attending

DELSUTH, Oghara Metabolic Clinic, with a view to determining possibility of linking it with risk of cardiovascular impairments.

Materials and Methods

In this study, which is a cross-sectional study, a total of 713 participants were recruited. There were those who registered to DELSUTH's Metabolic Clinic for routine check-ups or on appointment. The Delta State University Teaching Hospital (DELSUTH) is an affiliate of the Delta State University (Abraka). With provision to provide medical care in over 20 Medical Specialties, the hospital attends to patients all over the entire Delta State and neighbouring States.

Informed consent was obtained from each recruited study participant before clinical presentations and other relevant details were obtained and subsequently segregated according to certain age groups, as well as gender.

Venipuncture was performed such that approximately 5mls of blood was obtained from each of the participants and distributed into tubes containing EDTA and fluoride oxalate. The entire blood was centrifuged, and the plasma was collected into 5 mL plain tubes with a Pasteur pipette and processed at -20ºC before lipid analysis was performed. A spectrophotometer was used to conduct the lipid analysis, and the normal operating assay protocol was followed. The following equations, as used in Idemudia and Atoe,[3] were used to measure the blood lipid indexes.

Friedewald equation for LDL Chol. = TC – TG/5 – HDL Chol. (mg/dL)
Non-HDL cholesterol, NHDL = Total Chol. – HDL Chol
Very low density lipoprotein, VLDL = Triglycerides/5
Atherogenic index of plasma, AIP = Log (TG/HDLChol.)
Atherogenic coefficient, AC = Non HDL Chol. / HDL Chol.
Castelli Risk Index I = TC / HDL Chol.
Castelli Risk Index II = LDLChol./ HDLChol.

Statistical analyses of the data obtained in the analysis were performed using SPSS® version-21. When required, the results were presented as 95th percentiles as well as the mean of replicated data.

Results

Clinical presentation of the study participants showed that out of 713 assessed, 24% were sufferers of hypertension (Table 1). However, 18.5% were on routine checkup. According to age distribution, most of the study participants were with the 51-60 years category (29.9%). Mean distribution of lipid profiles among the study population according to gender has been presented (Table 2). Total cholesterol ranged 119.63-125.94 mg/dL ($p>0.05$). HDL-Cholesterol levels in female (36.59 mg/dL) was significantly higher than those of the male (33.31 mg/dL) ($p<0.05$). Antherogenic ratio (AR) ranged from 5.76-5.85, whereas antherogenic index plasma did not significantly differ among the gender (0.51). Differences in Castelli Ratio (I) in both male (6.76) and female (6.85) were minimal ($p>0.05$) (Table 2).

The 95th percentile of lipid profiles among the study population has been presented (Table 3). Total cholesterol in the male was 194.6 mg/dL at 11-20 years compared to 209.5 mg/dL in the females within similar age category. Similarly, in the 21-30 years age category, total cholesterol in the female (230.6 mg/dL) was higher than those of the male (226.6 mg/dL). However, as the ages progressed (that is, above 40 years), total cholesterol in males

Table 1. Clinical presentation of participants.

Clinical condition	n (%)
Acute decompensation	4 (0.6)
Acute left ventricular failure	23 (3.2)
Cervical myelopathy	7 (1.0)
CCF 2^O HHDX	39 (5.5)
Chronic left leg ulcer	1 (0.1)
Chronic Liver dx	35 (4.9)
CKD	13 (1.8)
CVA	33 (4.6)
CVD	37 (5.2)
Decompensated HHF	4 (0.6)
DKA	2(0.3)
Elevated BP	13(1.8)
FSLP	7 (1.0)
Hemorrhage CVD	2 (0.3)
Hepatomegaly	2 (0.2)
HHDx	33 (4.6)
HIV Encephalopathy	17 (2.4)
Hypertension	171(24.0)
Hypercholectera	1 (0.1)
Left foot gangrene 2^0 peripheral	5 (0.7)
Left hemispheric	2 (0.3)
Left hypertrophy	2 (0.3)
Lucipunt wart failure	3 (0.4)
Multiple myeloma	12 (1.7)
P.VHD	13 (1.8)
Palpitation IRC	11 (1.5)
Poorly controlled BP	19 (2.7)
PUD	1 (0.1)
Recurrent miscarriage	2 (0.3)
Routine checkup	132 (18.5)
RVD	7 (1.0)
Seizure	7 (1.0)
Somatization disorder	3 (0.4)
Stroke	22 (3.1)
T2 DM	28 (3.9)
Total	713 (100.0)

Table 2. Mean distribution of lipid profiles among the study population according to gender.

Parameters	Male (n=356)	Female (n=357)	T-test	P-value
TC (mg/dL)	119.63	125.94	1.699	0.090
HDL (mg/dL)	33.31	36.59	2.500	0.013*
TRIG (mg/dL)	88.44	90.10	0.362	0.718
LDL (mg/dL)	68.63	71.33	0.732	0.464
VLDL (mg/dL)	17.69	18.02	0.362	0.718
NHDL (mg/dL)	86.32	89.35	0.782	0.435
AR	5.76	5.85	0.080	0.936
AIP	0.51	0.51	0.031	0.975
CRI (I)	6.76	6.85	0.080	0.936
CRI (II)	4.73	4.67	-0.062	0.951

TC: total cholesterol; HDL: HDL-cholesterol; LDL: LDL—cholesterol; TRIG: triglycerides; VLDL: Very Low Density Cholesterol: NHDL: Non-HDL—cholesterol; AR: antherogenic ratio; AIP: Antherogenic Index of Plasma; CRI (I&II): Castelli Ratio (I&II).

became higher than those in the female. Antherogenic ratio as well as antherogenic index of plasma were higher in the female gender at ages below 40 years (Table 3).

For the difficulty of obtaining 95th percentile of older ages due to low number, the means of the profiles within these age categories were obtained. Results showed significant differences in mean values for TC and LDL respectively (Table 4). Whereas, TC was highest in the >100 years age category (= 151.67 mg/mL), the lowest mean TC value was obtained in the 71-80 years category (= 100.08 mg/mL). No significant differences in lipid indices and rations were obtained among the age categories.

Mean values for lipid profiles according to the clinical presentations (irrespective of gender and age category) of the participants showed that significant distribution of the lipid ratios (AR, AIP, CRI I and CRI II) respectively (Table 5). The mean TC was highest in participants who were sufferers of Hemorrhagic stroke (159.0 mg/mL) and Lucipurr heart failure (137.3 mg/mL) respectively. TC of 124.9 mg/mL was recorded for those on routine checkup.

In an attempt to know number of participants based on their respective clinical presentations that were positive for hypercholesterolemia, data on clinical details of the participants were cross-tabulated against occurrence of hypercholesterolemia based on a cholesterol reference level of 92 -180 mg/dL (Table 6). Out of the 713 participants, a total of 113 were positive for hypercholesterolemia, representing 15.84% of the study population; 20.4 % of the total population of participants that were positive for hypercholesterolemia only reported to the clinic on routine check-up, whereas 30.1% had hypertension. However, according to age categorization, hypercholesterolemia was more prominent within the 41-60 years bracket (23.9-25.7%; Table 7) and least above the age of sixty.

Discussion

The current study examines the lipid profile of patients at the DELSUTH Delta State Metabolic Clinic. The female gender had higher total cholesterol (as determined by the 95th percentile) than the male gender when both were over 40 years old. The effects of the lipid ratios were the same. Until midlife (ages 50 to 60), women have a lower risk of atherosclerotic cardiovascular disease than men, though the difference starts to close after menopause. Swiger *et al.*[9] earlier hypothesized that the average lipid profile of women undergoes unfavorable changes compared with men after midlife. Godsland *et al.*[10] opined that as women age, the serum concentrations of triglycerides, low-density lipoprotein cholesterol and Total Cholesterol (TC) surpass those in men. Menopause itself is associated with an increased prevalence of dyslipidemia but not hypertension or insulin resistance, independent of the effect of chronological aging.[11-13]

Table 3. Presentation lipid profiles (95th percentiles) among the study population according to gender and age.

Age (years)	(n)	TC (mg/dL)	HDL	TRI	LDL	VLDL	NHDL	AR	AIP	CRI_I	CRI_II
Male											
< 11	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11-20	23	195	56	228	147	45.6	154	8.4	0.9	9.4	7.2
21-30	53	227	75.4	216	179	43.2	192	31.8	1.3	32.8	28.5
31-40	62	211	52.9	226	149	45.3	194	22.1	1.4	23.1	16.7
41-50	69	227	69.5	192	181	38.3	214	23.9	1.4	24.9	20.5
51-60	109	197	64	194	147	38.7	163	8.9	1.1	9.9	7.8
61-70	23	245	61.6	220	190	44	209	28.7	1.5	29.7	22.8
71-80	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
81-90	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91-100	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
> 100	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Female											
< 11	6	227	72	99	185	19.8	205	10.8	1	11.8	9.8
11-20	25	210	66.7	202	172	40.3	204	119	2.1	120	91.4
21-30	52	231	73.7	241	148	48.3	190	84.4	1.9	85.4	68.6
31-40	76	225	68.8	212	187	42.4	201	18	1.2	19	15.5
41-50	64	234	71.5	213	189	42.5	204	17.6	0.9	18.6	16.4
51-60	104	231	65	216	176	43.2	187	10.7	1.4	11.7	10.1
61-70	7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
71-80	13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
81-90	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91-100	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
> 100	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TC: total cholesterol; HDL: HDL-cholesterol; LDL: LDL—cholesterol; TRIG: triglycerides; VLDL: Very Low Density Cholesterol; NHDL: Non-HDL—cholesterol: AR: antherogenic ratio; AIP: Antherogenic Index of Plasma; CRI (I&II): Castelli Ratio (I&II); Palpitation IRC: Palpitation Irrespective of Underlying Cause.

Table 4. Mean distribution of lipid profiles among the study population according to age.

Age (years)	(n)	TC (mg/dL)	HDL	TRI	LDL	VLDL	NHDL	AR	AIP	CRI_I	CRI_II
< 11	17	137.47ab	34.53	83.68	96.29ab	102.9	19.26	3.53	0.51	4.53	2.88
11-20	48	115.62ab	32.98	64.88	88.85ab	82.65	17.77	8.21	0.55	9.21	6.62
21-30	105	124.54ab	35.41	69.29	99.21ab	89.13	19.84	7.97	0.56	8.97	6.28
31-40	138	121.28ab	34.8	68.67	89.04ab	86.48	17.81	5.57	0.52	6.57	4.29
41-50	133	127.8ab	35.66	73.41	93.63ab	92.14	18.73	6.85	0.52	7.85	5.69
51-60	213	119.47ab	35.36	67.44	83.36ab	84.11	16.67	4.14	0.49	5.14	3.43
61-70	36	133.86ab	32.64	84.33	84.47ab	101.2	16.89	6.22	0.51	7.22	5.4
71-80	12	100.08a	31.67	54.87	67.75ab	68.42	13.55	2.06	0.29	3.06	1.6
81-90	4	123.50ab	35	70.75	88.75ab	88.5	17.75	3.82	0.38	4.82	3.33
91-100	4	106.25ab	36.5	47.55	111.00a	69.75	22.2	2.33	0.64	3.33	1.52
> 100	3	151.67b	36.67	103	60.00b	115	12	4.23	0.48	5.23	3.8
F-statistic		1.083	0.21	0.957	0.851	0.955	0.851	0.702	0.773	0.702	0.645
p-value		0.373	0.995	0.48	0.58	0.482	0.58	0.723	0.655	0.723	0.775
Sign.		*	NS	NS	*	NS	NS	NS	NS	NS	NS

Means on the same column with similar alphabets do not differ from each other significantly (p>0.05). TC: total cholesterol; HDL: HDL-cholesterol; LDL: LDL—cholesterol; TRIG: triglycerides; VLDL: Very Low Density Cholesterol; NHDL: Non-HDL—cholesterol: AR: antherogenic ratio; AIP: Antherogenic Index of Plasma; CRI (I&II): Castelli Ratio (I&II); Palpitation IRC: Palpitation Irrespective of Underlying Cause.

Table 5. Mean distribution of lipid profiles among the study population according to clinical presentation.

Clinical condition	TC	HDL	TRI	LDL	VLDL	NHDL	AR	AIP	CRI_I	CRI_II
Acute left Ventricular failure	122	40.5	87.4	63.6	17.5	81.1	3	0.4	4	2.4
Routine checkup	125	33.9	86.1	73.8	17.2	91	5.3	0.5	6.3	4.3
CVA	121	35.5	88	68	17.6	85.6	3.3	0.5	4.3	2.7
HTN	128	35	91	74.5	18.2	92.7	5.6	0.5	6.6	4.5
CCF 2^O HHDX	132	33.8	83.8	81.4	16.8	98.2	5.9	0.5	6.9	4.8
T2 DM	112	35.1	100	57.2	20	77.3	11.6	0.6	12.6	9
HHDx	113	32.9	84	63.7	16.8	80.5	3.4	0.4	4.4	2.8
HIV Encephalopathy	108	42.5	71.5	51	14.3	65.3	2.1	0.4	3.1	1.7
Stroke	122	35.8	90	68.6	18	86.6	4.1	0.5	5.1	3.5
Seizure	133	21.4	105	90.9	20.9	112	35.9	0.9	36.9	31.8
Chronic Liver dx	113	33.3	104	59.2	20.7	79.9	6.2	0.6	7.2	4.6
RVD	127	38.6	99.4	69	19.9	88.9	10.5	0.4	11.5	9.8
PUD	100	29	9	69.2	1.8	71	2.5	0.5	3.5	2.4
CVD	115	37	90.4	60.4	18.1	78.5	3.2	0.4	4.2	2.6
CKD	95.6	27.7	67.6	54.4	13.5	67.9	11.4	0.5	12.4	10.7
Multiple myeloma	101	41.3	98.9	39.8	19.8	59.6	8.1	0.6	9.1	6.4
Cervical myelopathy	116	44.6	108	49.5	21.6	71.1	4.9	0.7	5.9	3.6
Acute decompensation	115	31.3	104	62.4	20.9	83.3	10.8	0.7	11.8	8.7
Lucipunt wart failure	137	38	42.3	90.9	8.5	99.3	2.5	0.2	3.5	2.3
DKA	72.5	27.5	85.5	27.9	17.1	45	1.8	1.3	2.8	0.8
Poorly controlled BP	142	36.3	96.7	86	19.3	105	4.2	0.5	5.2	3.5
P.VHD	118	39.5	88.2	61.3	17.6	78.9	2.5	0.3	3.5	2.1
FSLP	116	33.3	78.4	66.7	15.7	82.4	17.4	0.6	18.4	13.9
Left foot gangrene 2^0 peripheral	149	30.2	56.4	108	11.3	119	5.2	0.6	6.2	4.9
Recurrent miscarriage	81	46.5	62.5	22	12.5	34.5	0.8	0.4	1.8	0.5
Hemorrhage CVD	159	37.5	123	96.9	24.6	122	3.1	0.4	4.1	2.4
Somatization disorder	123	35.7	61.3	74.7	12.3	87	2.9	0.4	3.9	2.5
Elevated BP	131	38	86.2	76.1	17.2	93.4	3.1	0.6	4.1	2.5
Palpitation IRC	135	34	100	80.8	20	101	4.6	0.5	5.6	3.8
Hypercholectera	86	1	202	44.6	40.4	85	85	2.3	86	44.6
Decompensated HHF	126	37	99.5	69.4	19.9	89.3	2.8	0.4	3.8	2.2
Left hemispheric	207	17.5	127	164	25.4	189	13.6	0.9	14.6	12.1
Left hypertrophy	66	19	66	33.8	13.2	47	2.8	0.6	3.8	1.8
Chronic left leg ulcer	247	15	41	224	8.2	232	15.5	0.4	16.5	14.9
Hepatomegaly	115	18	92	78.6	18.4	97	5.4	0.7	6.4	4.4
F-statistic	1.21	0.88	0.6	1.48	0.6	1.33	1.96	1.87	1.96	1.62
p-value	0.19	0.67	0.97	0.04	0.97	0.1	0	0	0	0.01
Significance	NS	NS	NS	*	NS	NS	**	**	**	*

TC: total cholesterol; HDL: HDL-cholesterol; LDL: LDL—cholesterol; TRIG: triglycerides; VLDL: Very Low Density Cholesterol; NHDL: Non-HDL—cholesterol: AR: antherogenic ratio; AIP: Antherogenic Index of Plasma; CRI (I&II): Castelli Ratio (I&II); Palpitation IRC: Palpitation Irrespective of Underlying Cause.

Adverse levels of blood lipids constitute a well-established cardiovascular disease risk factor.[14] Studies in children and young adults conducted by Clarke *et al.*; [15] Berenson *et al.*[16] and Freedman *et al.*[17] have documented tracking of lipid levels over time, and their association with early atherosclerotic lesions. Several cross-sectional and longitudinal studies have described the changes of lipid levels by age during childhood and adolescence;[18,19] fewer studies have taken pubertal stage into account. The effects of age distribution in the study were notable. Whereas within the lower age categories (11-20 years), total cholesterol and lipid ratios were reduced in both gender, compared to when participants were much older. This may relate to sexual maturity. Bertrais *et al.*[20] investigated the relationships between lipid levels and sexual maturity, independently of age-related differences, with a view to determining possible differences related to sexual maturity across the percentiles of the lipid distributions. They reported that in boys and girls, total cholesterol levels were significantly associated with pubertal stage after controlling for age, thus emphasizing the importance of sexual maturity, even for a given age, for interpreting lipid levels in children. Lipid levels change markedly by pubertal stage, and patterns differ by sex and race. Chronological age ranges widely within a given pubertal stage and is an insensitive indicator of pubertal stage and the related changes in lipid levels.[21]

The importance of the current study, particularly in measuring the risk of hypercholesterolemia as well as other forms of dyslipidemia has been underscored. This risk may be higher within the active age period of 30-60 years. The study also significantly demonstrated the elevated lipids levels in younger women in the study population than older men.

The major limitation faced was during the recruitment of participants in the study; a lot of the participants were not willing to give consent for their information to be used in the study.

Table 6. Clinical detail * hypercholesterolemia Cross-tabulation (Cholesterol reference level = 92 -180 mg/dL).

Clinical detail	Hypercholesterolemia Negative	Positive (n)	Positive (%)	Total
Acute left ventricular failure	20	3	2.7	23
Routine checkup	109	23	20.4	132
CVA	30	3	2.7	33
HTN	137	34	30.1	171
CCF 2^O HHDX	33	6	5.3	39
T2 DM	24	4	3.5	28
HHDx	31	2	1.8	33
HIV Encephalopathy	16	1	0.9	17
Stroke	18	4	3.5	22
Seizure	5	2	1.8	7
Chronic Liver dx	30	5	4.4	35
RVD	6	1	0.9	7
PUD	1	0	0	1
CVD	32	5	4.4	37
CKD	12	1	0.9	13
Multiple myeloma	12	0	0	12
Cervical myelopathy	6	1	0.9	7
Acute decompensation	4	0	0	4
Lucipunt wart failure	2	1	0.9	3
DKA	2	0	0	2
Poorly controlled BP	16	3	2.7	19
P.VHD	11	2	1.8	13
FSLP	6	1	0.9	7
Left foot gangrene 2^0 peripheral	3	2	1.8	5
Recurrent miscarriage	2	0	0	2
Hemorrhagic CVD	1	1	0.9	2
Somatization disorder	2	1	0.9	3
Elevated BP	11	2	1.8	13
Palpitation IRC	8	3	2.7	11
Hypercholesterolemia	1	0	0	1
Decompensated HHF	4	0	0	4
Left hemispheric	1	1	0.9	2
Left ventricular hypertrophy	2	0	0	2
Chronic left leg ulcer	0	1	0.9	1
Hepatomegaly	2	0	0	2
Total	600	113		713

*Palpitation IRC: Palpitation Irrespective of Underlying Cause.

Conclusions

During sexual development or maturity, plasma lipid levels change drastically by each developmental stage as seen in the current study; and patterns vary by age and sex. Within a given pubertal stage, chronological age can differ greatly, and in these situations, it is an insensitive predictor of the expected status of changing lipid levels. When assessing the screening and diagnostic criteria for the purpose of classifying individuals with elevated blood lipid levels, pubertal or sexual development may perhaps be taken into account.

Table 7. Age category * hypercholesterolemia Cross-tabulation (Cholesterol reference level = 92 -180 mg/dL).

Age category (years)	Hypercholesterolemia Negative	Positive (n)	Positive (%)	Total
< 11	13	4	3.5	17
11-20	44	4	3.5	48
21-30	91	14	12.4	105
31-40	117	21	18.6	138
41-50	106	27	23.9	133
51-60	184	29	25.7	213
61-70	25	11	9.7	36
71-80	11	1	0.9	12
81-90	3	1	0.9	4
91-100	4	0	0.0	4
> 100	2	1	0.9	3
Total	600	113		713

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