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ASSESSMENT OF SELECTED CARDIOVASCULAR PARAMETERS IN ELDERLY POPULATION OF VADODARA.

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ABSTRACT

INTRODUCTION: India is an aging nation and we are having presently around 8.0-8.5% aged population who are inadequately studied for their gerontology norms and exposed to limited health care due to reasons. Vadodara is a city in central Gujarat with large population of elderly persons. Their organizations are also active. **MATERIAL AND METHODS:** We studied 60 elderly participants in age arrange of 60-80+; 30 males and 30 females of middle class, staying for more than 5years in urban milleu in community, in different pockets of Vadodara city. Careful history, clinical examination of relevance, demographic parameters , resting heart rate, resting blood pressure, pulse oxymetry, and single time ECG tracings in resting state of all twelve classic leads were determined. **OBSERVATIONS AND RESULTS:** Findings are presented in graphs and tables. The demographic parameters are within /around range of other urban individuals in surrounding regions, ECG showed P wave features, and ventricular features [quite less common in our study] as shown in tables, HR and SBP/DBP/PP/MAP were in accordance to expectation and correlate well with age characteristics. **CONCLUSION:** We conclude that the demographic parameters of elderly of Vadodara we studied, are within range of normal uncomplicated aging individual and for ECG findings, the features correlate well with observations of investigators in past and present. at home or abroad.

KEY WORDS: Elderly, Demographic, Pulse-oxymetry, Blood Pressure, Electrocardiography

INTRODUCTION

Aging of human beings is a universal phenomenon.

It is stated that a generally agreed on panel of biomarkers has yet to emerge, so currently, it is impossible to quantitate aging.[1]

It is also noted[2]that, elderly people after retirement at sixty five years, become more liable to infection of respiratory tract, cardiovascular disorders and malignant diseases.

In world over[3], and also in India the aging population is increasing. This is due to recent and continuous health care advances, and due to which birth rate would not fall further but life expectancy will increase.

India is labeled as country with aging population.

For long, it is stated that with advancing age significant reduction in functional capacities occur in many different organ systems. Such changes are documented by authors.[4]

Cardiovascular changes in elderly population are well documented by authorities.[5,6,7]

Paul White[8]has stated by study of 1251 consecutive autopsies that cause of death in eighties was 64 % due to cardiovascular disease.

As these studies were done, either fairly in past, or on population of different ethnic or racial groups there is apparent need for fresh assessment, with Indian population.

Vadodara, [msl-129mt; 22.30^0-N;18.70-E;with Av.Humidity-40%] located in region of central Gujarat, is a essentially city of service class people, probably due to large number of industries around. It has reasonably better ambience with moderate climate, tranquility, greenery and fairly advanced health care infrastructure. As such, it is one of the preferred places of elderly citizens during the retirement phase of life. Various centers and senior citizen associations are active in this city.

It is therefore apt to assess and determine the bio-gerontologic characteristics of this large population. This study of 60 elderly citizens is done to add and enrich similar database of study of the population by medically approved methods and equipments which can assist in establishing the approved reference values of these parameters more precisely. Indeed there is paucity of standardized norms in this age group at home**.**

MATERIAL AND METHODS

We studied the mentioned parameters in community dwelling 30 male and 30 female apparently healthy participants of age of 60 years, and above, who were judged suitable by given panel of criteria.

It was not deemed necessary to compare with healthy young population as, these parameters may be influenced by individual intrinsic and extrinsic milleu and as such, may be variable from time to time; still however an attempt is made to assess the profiles in background studies at home in past, also of recent studies by expert gerontologists in India, and abroad.

The study was proposed to, and consented by the IEC [Institutional Ethical Committee].

The participants of age group of 60 years and above, males and females were examined by single time qualitative and quantitative assessment, by careful history taking and medically approved equipments of precision which can objectively assess the values [to exclude personal factor of errors]. The participants were acquainted to program, encouraged to ask relevant questions, and consent for participation taken. General physical examination and systemic examination was undertaken by qualified doctor. Due care for the human dignity, comfort, and privacy was exercised. The examinations were done in well equipped trust private

hospital, in societies of participant residents or in Karlelibaug senior citizen centre premises. In case of lady participant, the ECG was taken by trained and qualified female nurses in privacy. As many cardiovascular parameters are related to demographic values main demographic parameters like Weight [in Kg.], Height [in Cm.] and BMI[Body Mass Index] were also examined.

ECG assessment was done by CLARITY AUTOMATIC 12 LEAD ECG Equipment[ISO-9001Company] Electrocardiograph machine was standardized [built in uniform low voltage power supply for safety, and required no earthing. The equipment gave automatic read out of presented parameters digitally.]

Blood pressure was assessed by OMRON DIGITAL Equipment [Omron Health Care Inc. Kyoto, Japan], in sitting position after adequate physical and mental rest.[5 minutes][Resting Blood Pressure Values]

S PO2 [Saturation of partial pressure of oxygen] was assessed by OMRON PULSE OXIMETER,[Company make as above], giving the values digitally along with Pulse Wave Tracing, And Heart Rate.

INCLUSION CRITERIA

- The elderly individuals of either sex, with age above 60 years, residing in Vadodara for not less than 5 years,
- They have given consent for this study.
- Apparently healthy. No major hospitalization, heart problem, or operation, or life supported by heart prosthesis, stent, pace maker device or drugs influencing cardio respiratory mechanisms.
- No abnormal profiles of heart-lung-blood related biochemical or pathological nature..

EXCLUSION CRITERIA

- Those who have any acute or chronic illness related to respiratory, cardiovascular or hematologic nature which can affect the study.
- Have any history of major hospitalization or Cardiovascular system related operation like CABG [Coronary Artery Bypass Graft] /STENT/IMPLANT/PACEMAKER etc.
- Who have any major constitutional illness like Diabetes, Hypertension, Tuberculosis, Severe Anemia Etc., or taking drugs for it.
- Who do not give consent.

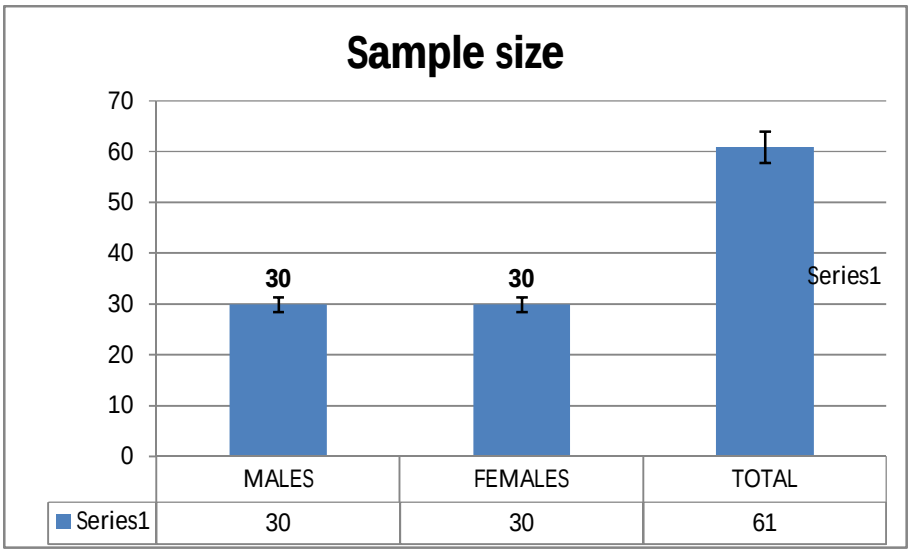
OBSERVATIONS

- Following parameters were assessed:
- Age, Height, Weight, Body Mass Index, Resting Blood Pressure [Systolic, Diastolic, Pulse Pressure, and Mean Pressure], Heart Rate, value of Partial Pressure Of Oxygen Saturation Of Capillary Blood , General pattern of pulse tracing.
- Also, ECG[12 LEADS]- duration of P wave, QRS wave, PQ interval, QT interval, QTc, QT/QTc %, QT/RR %, values of axis in degrees of P, QRS, and T waves evaluated.
- The ECG was studied for noting rate, regularity, individual waves, P:QRS ratio, morphologic anomaly, important intervals and their values, [duration and voltage] ,wave width, slurring, grouping of waves, dropped beats, bizarre beats, elevation / burial of intervals, arrhythmias[brady. / tachy.] electrolyte anomalies, signs of specific changes of certain phenomena [Wenckebach/ WPW syndr. /Long QT Syndr. /Torsade de pointes] certain signs if at all present like Brugada / Inrinsicoid deflections/Josephson's s. /

V Tach. Etc. The parameters related to electrical axis of ECG forP, QRS complex, And T waves were studied. The results are presented in charts.

- For abovementioned characteristics literature with all12 ECG LEADS shown with illustration was selected as reference.

Figure-1
Sample Size for male and female gender



STATISTICAL ANALYSIS:

The studied parameters were collected in micro soft excel sheet, and processed statistically by SPSS soft ware and presented by tables and graph showing domains with max, min, mean, S.D. and where applicable, by significance.

The male and female parameters are presented separately; but the comparison of critical population with normal young counterpart is not attempted, keeping in mind the moment to moment variability and nature of parameters.

Table: 1

Descriptive Statistics analysis for 30 Female participants

	AGE	WT.Kg.	HT.Cms.	BMI	SBP	DBP	HR	Spo2
Mean	65.40	58.37	154.30	24.57	132.20	80.63	77.63	97.67
Median	63.00	58.00	155.00	24.00	132.50	80.00	79.50	98.00
Mode	60	50[a]	158	23[a]	140	80	80	97
Std. Deviation	5.673	9.050	4.801	2.861	10.179	5.156	12.322	.959
Range	20	42	16	14	50	20	52	3
Minimum	60	50	148	20	100	68	56	96
Maximum	80	92	164	34	150	88	108	99

a. Multiple modes exist. The smallest value is shown

b. The table showing the values of relevant selected demographic and non ECG cardiovascular domains and their statistical profile of 30 female participants.

Table:2

Descriptive Statistics for 30 Female for ECG parameter changes

	P	QRS	PQ	QT	QTc	QT/QTc%	QT/RR	AXIS-P	AXIS-QRS	AXIS-T
Mean	107.93	95.83	162.10	393.97	437.47	90.30	49.80	26.33	13.93	44.27
Median	112.00	95.00	161.00	372.50	416.00	89.00	49.00	40.00	27.50	56.00
Mode	95[a]	97	182	321[a]	396[a]	83[a]	49	16[a]	-88	88
Std. Deviation	14.776	10.293	19.930	60.384	66.366	7.975	9.371	65.690	60.043	69.609
Range	60	49	72	233	298	30	37	267	203	246
Minimum	72	76	131	320	340	74	37	-145	-90	-88
Maximum	132	125	203	553	638	104	74	122	113	158

a. Multiple modes exist. The smallest value is shown

b. The assessment of different values of waves and axis domains of standard 12 lead ECG with the assessed statistical profile of 30 females participants.

Table: 3

Descriptive Statistics for 30 Male participants

	NO.	AGE	WT (.Kg)	HT (Cms)	BMI	SBP (mmHg)	DBP (mmHg)	HR	Spo2
Mean	15.50	70.37	62.30	165.23	23.07	136.13	78.67	69.33	97.33
Median	15.50	70.00	62.00	165.00	23.00	137.50	80.00	67.50	97.00
Mode	1[a]	70	60	165	23	140	80	81	97
Std. Deviation	8.803	6.178	3.436	3.191	1.507	9.916	7.535	14.775	1.155
Range	29	25	16	16	6	49	31	66	5
Minimum	1	60	54	158	20	110	59	40	94
Maximum	30	85	70	174	26	159	90	106	99

a. Multiple modes exist. The smallest value is shown

b. The table showing the values of relevant selected demographic and non ECG cardiovascular domains and their statistical profile of 30 male participants.

Table: 4

Descriptive Statistics for 30 (Male) for ECG parameters

	P	QRS	PQ	QT	QTc	QT/QTc%	QT/RR%	AXIS-P	AXIS-QRS	AXIS-T
Mean	105.43	98.20	168.37	400.67	416.40	97.07	44.80	59.80	24.73	40.80
Median	106.00	95.00	168.50	380.00	399.00	97.00	43.00	50.50	26.00	45.00
Mode	113	91[a]	193	338[a]	393	97	42	32[a]	10[a]	45[a]
Std. Deviation	15.007	11.149	19.772	70.052	78.685	11.820	11.722	30.682	60.770	77.647
Range	55	45	75	289	349	47	45	163	330	305
Minimum	78	75	140	251	274	76	28	17	-154	-140
Maximum	133	120	215	540	623	123	73	180	176	165

a. Multiple modes exist. The smallest value is shown

b. The assessment of different values of waves and axis domains of standard 12 lead ECG with the assessed statistical profile of 30 males participants

Table: 5

Unpaired T test analysis for Non-ECG & ECG parameters among male and female participants.

Variable	t test (unpaired)	df	P value	Interpretation
Age	-3.661	29	.001	Significant difference
Weight	-2.140	29	.041	Significant difference
Height	-11.128	29	.000	Significant difference
BMI	2.445	29	.021	Significant difference
Diastolic Blood Pressure	1.185	29	.246	Non significant difference
Systolic Blood Pressure	-1.453	28	.157	Non Significant difference
Heart Rate	2.025	29	.052	Non significant difference
SpO2	1.284	29	.209	Non significant difference
Pulse	.675	29	.505	Non significant difference
QRS	-.807	29	.426	Non significant difference
PQ	-1.252	29	.220	Non significant difference
QT	-.373	29	.712	Non significant difference
QTc	1.109	29	.276	Non significant difference
QT/QTc%	-2.324	29	.027	Significant difference
QT/RR%	1.771	29	.087	Non significant difference
AXIS-P	-2.788	29	.009	Significant difference

AXIS-QRS	-.745	29	.462	Non significant difference
AXIS-T	.191	29	.850	Non significant difference

a. overall assessment of various variables by un paired 't' test, d f, 'p' value and significance of all selected demographic, non ECG Cardiovascular parameters and ECG parameters.

DISCUSSION

India is an ageing nation, according to criteria of ageing nation by WHO [World Health Organization] . Presently, prevalence of elderly population at rate of 8.0 -8.5 %, comes to 90 million, but expected to go to21 % by 2050[8]. 80 % of this is population is of the rural persons who are not adequately exposed to health study or health care provisions due to number of reasons. Total elderly number in India is second largest in the world, so, we need to cover entire population in adequate depth by large number of such and similar study to help them.

As body composition can influence heart condition or the relevant risk factors[8, 9] as such, we have included demographic parameters also.

It is said that cardiac disease is one of the commonest cause of morbidity and mortality in elderly hence this type of assessment done on Indian present day elderly population is justified.

Pathak has stated that elderly were more inquisitive to know about the exact figure of their blood pressure values. He has also stated that with increase in age, the blood pressure increased in Indians also, though not as much as in elderly people of advanced countries.[10]

Sharma also has similar observations that in US, elderly hypertension is about 90 % but not so in Indian elderly population[11].

On this Pickering while comparing the low adolescent maintained pressure throughout life, commented that, the answer would lie between security of life in tribe and insecurity in civilization.-which causes arterial pressure to rise with age.[12]

In Pathak's series, the basal blood pressure has range of systolic Blood Pressure between 100-204mm. of Hg. and Diastolic Blood Pressure60-130mm.of Hg. He puts 170/100mm.Hg.as hypertensive,140/80 mm. Hg. as intermediate and <140/80 as normotensive. He has quoted authorities of past, who fixed varied values of blood pressure as hypertension. As such we have not categorized for tension norms but simply mentioned the values. The values above 140/90 mm Hg. is hypertension.

In literature, there is evidence that BMI has association with left ventricular hypertrophy[12], and as it is also mentioned that the LVH[Left Ventricular Hypertrophy] identified by electrocardiography or echocardiography,[13] is associated with increased risk factor for coronary heart disease, sudden death[14], stroke, and overall cardiovascular disease.

ECG is not helpful for diagnosing heart failure but in diagnosis of Chamber Enlargement, Hypertrophy, M.I. and Cardiac Arrhythmia it can help the diagnosis of the cause. LVH may be present in over 65 % of people over 65 years.[15]

The mean H.R.[Heart Rate] in elderly Indians, in past study was males -75.9 and females -76 BPM[Beats Per Minute][Pathak]

We also observed ECG abnormality of minor importance in large percentage(vide-tables). This is substantiated in studies of past as well as by contemporary Indian experts. This is also by reason that even an increase in 1 millisecond more than the approved range, we categorized as abnormal, which may not influence the cardiac function so adversely till the heart variability or compensatory factors operate in the favor of elderly, but increase can influence the statistics of abnormal value. Sharma has stated that 9.7 % ECG changes in middle aged, in 65-84 years ECG changes suggesting CAD is 16.8 %. Incidence of arrhythmias in elderly is high. Atrial Premature Beats are very common in elderly and do not require treatment.[Sharma]So risk stratification by stress test is suggested; Author has also mentioned that Premature Ventricular Complexes are common in elderly. Kennedy[15] stated that less than half of elderly have normal ECG and ¼ have multiple electrocardiographic abnormalities. Sinus tachycardia, and non symptomatic extrasystole were only a few in our sample of uncomplicated aging participants. Pathak states that, “the elderly people should not be unnecessarily alarmed on finding slight deviation of ECG record.”

CONCLUSION

We studied 30 male and 30 female age specific community dwelling middle class elderly participants staying for more than 5 years in Vadodara city, with a purpose to find existence and magnitude of characteristics in demographic and selected cardiovascular parameters.

In the study we found that the demographic parameters were within expected range and not significantly high or low. We found that the

results of changes of heart rate, blood pressure, pulse wave and SPO2 are in accordance of valid study of past Indian or present international literature. The ECG changes also suggest described characteristics as presented in tables.The sample size being small, this data cannot help in fixing the norms or, aid as conclusive evidence for diagnosis, but indeed can help enriching such similar study.

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CONFLICT OF INTREST

Authors have no conflict of interest.

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