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HOMOEOSTENOSIS IN HEMATOLOGICAL PARAMETERS OF ELDERLY CITIZENS OF VADODARA CITY

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BSTRACT:

Background: According to UN norms, India is a country with ageing population. Experts state that the available literature on hematological parameters study is scanty at home; as such, we studied hematological parameters in 70 elderly males and 40 elderly females and attempted to compare with 40 young male and40 young female subjects respectively living in Vadodara city of Gujarat state, a favored place of retirement by many.

Material and method: We studied Demographic parameters like wt., height, BMI[Body Mass Index] ,and Hematological parameters-Hb, total-[RBC,WBC, Platelets Counts], PCV [Pack Cell Volume],ESR[Erythrocyte Sedimentation Rate] and blood indices like MCH,MCHC,MCV and RDW and ESR values. The elderly had good HRQOL [Health Related Quality Of Life] in last 1year, by their self appraisal.

Observations: In uncomplicated ageing elderly, Hb, RBC [total], MCH, MCHC and PCV were less than in young but near lower normal limits. Total WBC and Platelets count were within normal limits. The MCV [Mean Corpuscular Volume] was increased in elderly. We have not assessed the cause for it; also we have not done S. Creatinine value assessment.

Conclusion: We determined selected hematological parameters in a small sample size of elderly population of Vadodara city and found that there is definite yet mild age related homeostenosis of hematological parameters.

Key Words: Elderly, Hematological parameters, Homoeostenosis.

INTRODUCTION:-

Aging is regarded by experts as unquestionably complex and may require systems biology approach which may combine data driven modeling and hypothesis driven experimental studies.(1)

Due to improvement in hygiene and health care, human life expectancy has been increased at a steady rate of about 2.5 years per decade since the middle of nineteenth century (2)

The term elderly has a criterion of age 60 years from UN definition (3).United Nations have declared that, when 7.0% or more than that of total population is elderly, that country population be labeled as aging population.(3).The term elderly has a criterion of age 60 years from UN definition (4)

India has 7.8% of total population as ageing population (5) so, there is need to study our ageing population in depth. Also, the hematologic profile may be playing crucial role in molecular cascades in connection to cardio-pulmonary and vascular pro inflammation and oxidative stress in ageing. Moreover, these parameters may influence indexing of the collective dysfunctional totality suggesting homeostenotic functional reserve of elderly.

Ethnic, genetic and environmental factors being different, findings of foreign investigators with comparable series may not be suitable for Indian elderly, to establish probable reference values suitable for Indian subjects.

Keeping this view of existing paucity of such studies at home (6) in mind, we have tried to assess the values of hematological parameters in elderly citizens of Vadodara city, a city of preference of older population, located in central Gujarat, known for its good cultural, medical and tranquil environment with numerous activities for elderly population.

MATERIAL AND METHOD:-

Sample size-70 elderly males and 40 elderly females, compared with 40 young males and 40 young females respectively, having subjective self appraisal of Health Related Quality Of Life as good, selected from different areas randomly who used to visit public places, health institution or Senior Citizen spots, of age between 60 and 80 years, after screening through inclusion and exclusion criteria, complete history, clinical

examination, demographic and hematological assessment, and they were arranged in 2 groups-61-70;and 71-80 years

After getting the consent of IEC(Inst. Ethical Committee), taking the consent of participants and informing through the PIS (Participant Information Sheet) the details explained to them, and the study was undertaken.

The control group consisted of no.40 of apparently healthy male and female individuals residing in Vadodara city who were in age below 20 and above 18 years who were exposed to almost comparable background

INCLUSION CRITERIA -*Age-60-80 years; *Stay- Not at high altitude in last 2 years; *Sex-Male/Female; *Addiction-non smoker, non alcoholic; *Disease-no disease/H/S/O or S/S/O/ any disorder that can influence these parameters; *Not on any drug which can affect the parameters.

EXCLUSION CRITERIA -* The participant unwilling to accept the study.

STUDY TYPE-Cross sectional, prospective, partly qualitative and mainly objectively assessed single time quantitative. reading .

BLOOD SAMPLES -Fasting 12 hours; only fresh venous 2.0ml.blood sample in EDTA bulb collected by aseptic precautions ; with max. permissible time of 2-4 hrs. in freeze between 2-8 degree Celsius; and to avoid diurnal variation, collected between 9-00a.m. and 11-00 a.m. was accepted. Approved gadgets, materials and equipments including Automatic cell counter Sysmax model, were used.

STATISTICAL ANALYSIS – Microsoft excel and other approved statistical software using. formula of relevant nature. The degree of /% of homoeostenosis was calculated from values of mean [average] value of specific parameter of elderly and mean values of same parameter in young adults.

OBSERVATIONS AND RESULTS

Presented relevant data ; graphically and by tables. Mean; Standard Deviation; max-min. values, '*p*' value; tabular '*t*' test findings; and standard error of difference between two means presented to 5% was displayed by error bars.**Figures for homoeostenosis of RDW,ESR, total WBC count and Platelet Cell count was not determined.**

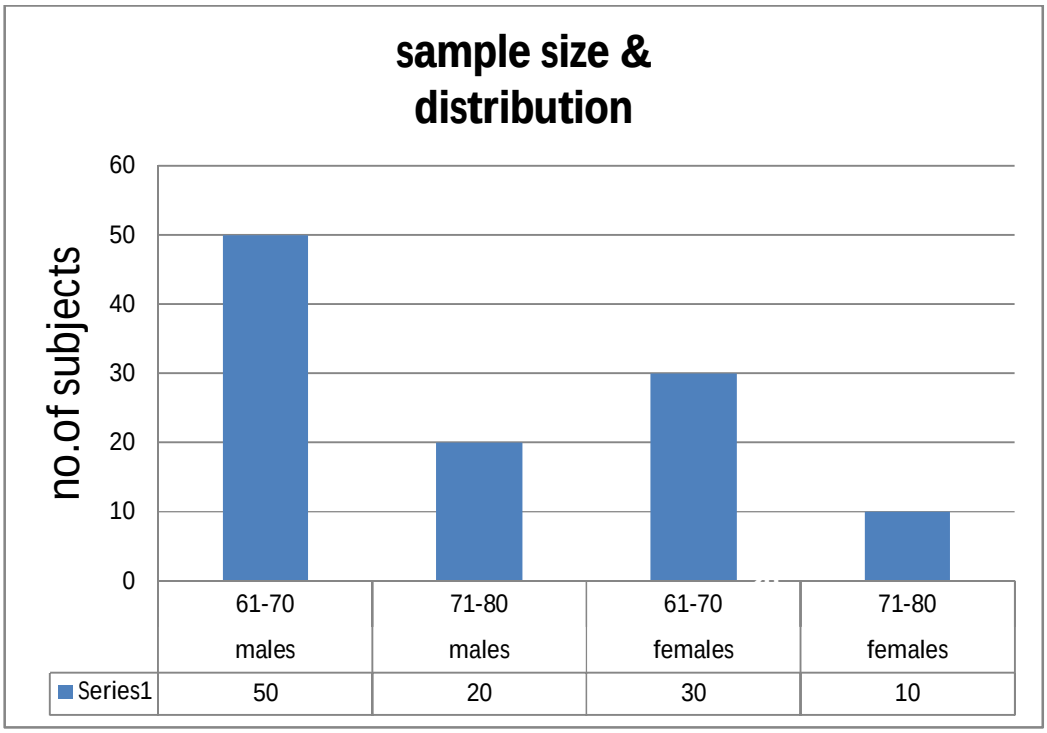

TABLE 1 - Demographic Parameters of Elderly Participants [n =110]

NUMBER N=	SEX	AGE GROUP	ITEM	AGE IN Yrs.	WT. IN Kg.	HT. IN Cms .	BMI
30	FEMALE	61-70	AV.	63.73	61.26	152.86	26.89
			S.D.	3.05	13.13	5.58	4.25
10	FEMALE	71-80	AV.	72.6	64.3	161	24.88
			S.D.	1.74	6.55	1.96	2.66
50	MALE	61-70	AV.	65.14	73.32	166.92	26.1
			S.D.	2.72	12.14	5.06	3.66
20	MALE	71-80	AV.	73.85	64.09	168.09	22.66
			S.D.	2.05	4.23	6.98	2.14

TABLE 2 - Hematological Parameters of Elderly Participants [n=110]

NUMBER N=	SEX	AGE GROUP	ITEM	HB.-G%	H.STENOSIS OF % OF Hb.	RBC[T] m../CMM.	H.STENOSIS OF RBC IN %	PCV-MM.	H.STENOSIS OF PCV IN %
30	FEMALE	61-70	Average	11.04	*12.9	4.12	*10.24	34.4	*13.83
			S.D.	2.09		0.37		5.9	
10	FEMALE	71-80	Average	11.6	*8.45	3.73	*18.74	37.7	*5.57
			S.D	0.77		0.27		1.8	
50	MALE	61-70	Average	13.68	0.7	4.62	2.95	41.76	0.48
			S.D.	1.23		0.47		4.3	
20	MALE	71-80	Average	12.29	*9.5	4.07	*11.33	40.37	*3.79
		S.D.	S.D.	1.16		0.47		1.23	
40	Males control *(17)	18-20	Average	13.58		4.76		41.96	
			S.D.	1.05		0.38		4.51	
40	Females control *(17)	18-20	AVERAGE	12.67		4.59		39.92	
			S.D.	1.10		0.29		2.70	

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TABLE 3 – Blood indices with % Homeostenosis in Critical Population

NUMBER n =	SEX	AGE GROUP	ITEM	MCV µCUBE	H.STENOSIS OF MCV- IN %	MCH PG.	H.STENOSIS OF MCH -IN %	MCHC G/DL	H.STENOSISOF MCHC -IN %
30	FEMALE	61-70	Average	83.13	4.49	26.7	0.37	31.82	---
			S.D.	11.94		4.33		1.47	
10	FEMALE	71-80	Average	101.46	*16.62	31.11	---	30.66	*3.29
			S.D	3.81		1.21		1.33	
50	MALE	61-70	Average	89.01	2.31	29.92	---	32.51	0.86
			S.D.	0.47		2.07		0.99	
20	MALE	71-80	Average	99.68	*14.57	30.15	---	30.04	*8.39
		S.D.	S.D.	11.92		2.39		1.84	
40	MALES CONTROL *(17)	18-20	Average	---		28.67		32.79	
			S.D.	---		1.90		2.24	
40	FEMALES CONTROL *(17)	18-20	average	---		27.60		31.70	

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TABLE 4 – Data other than above Hematological parameters

FIGURES FOR HOMOEOSTENOSIS OF RDW, ESR, TOTAL WBC COUNT AND PLATELET CELL COUNT IS NOT DETERMINED.

NUMBER –n =	SEX	AGE GROUP	ITEM	RDW	ESR	WBC TOTALCOUNT-IN K./CMM.	PLT CNT. IN LAC/CMM.
30	FEMALE	61-70	Average	13.22	12.76	6266	3.02
			S.D.	1.46	6.80	1399.3	.5629
10	FEMALE	71-80	Average	11.2	11.6	7500	2.554
			S.D	1.5	2.36	2165	.7809
50	MALE	61-70	Average	12.38	10.12	6370	2.619
			S.D.	0.94	4.59	1090	0.495
20	MALE	71-80	Average	11.49	9.33	6742	2.729
		S.D.	S.D.	1.11	1.17	1321	.6067
40	MALES CONTROL *(17)	18-20	Average	46.31	--	--	--
			S.D.	4.55	--	--	--
40	FEMALES CONTROL *(17)	18-20	Average	44.04	--	--	
			S.D.	2.67	--	--	--

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TABLE 1. Showing Red blood profiles of Male (n=40) and Females (n=40)

Blood profile	Male	Female	P-value
RBC Count	4.76±0.38	4.59±0.29	0.075
Hb (g/dl)	13.58±1.05	12.67±1.10	0.005*
HCT (%)	41.96±4.51	39.92±2.70	0.064
MCH(pg)	28.67±1.90	27.60±1.61	0.041*
MCHC(g/dl)	32.79±2.24	31.70±0.93	0.033
RDW (fl)	46.31±4.55	44.04±2.67	0.036*

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Table presented to compare the corresponding parameters in young males and females of Vadodara.[Acknowledgement:- given with the values.] done with same model type of auto analyzer and comparable protocols.(17),during same year at Vadodara , done by our colleagues at SBKSMI&RC in our department, because equivocally accepted standard reference values for Vadodara young individuals has not been established. As the above study has not included MCV assessment, for comparing the MCV [Mean Corpuscular Volume] we utilized the MCV value for young adults from medical book as 87μ cube, to compare with elderly value.

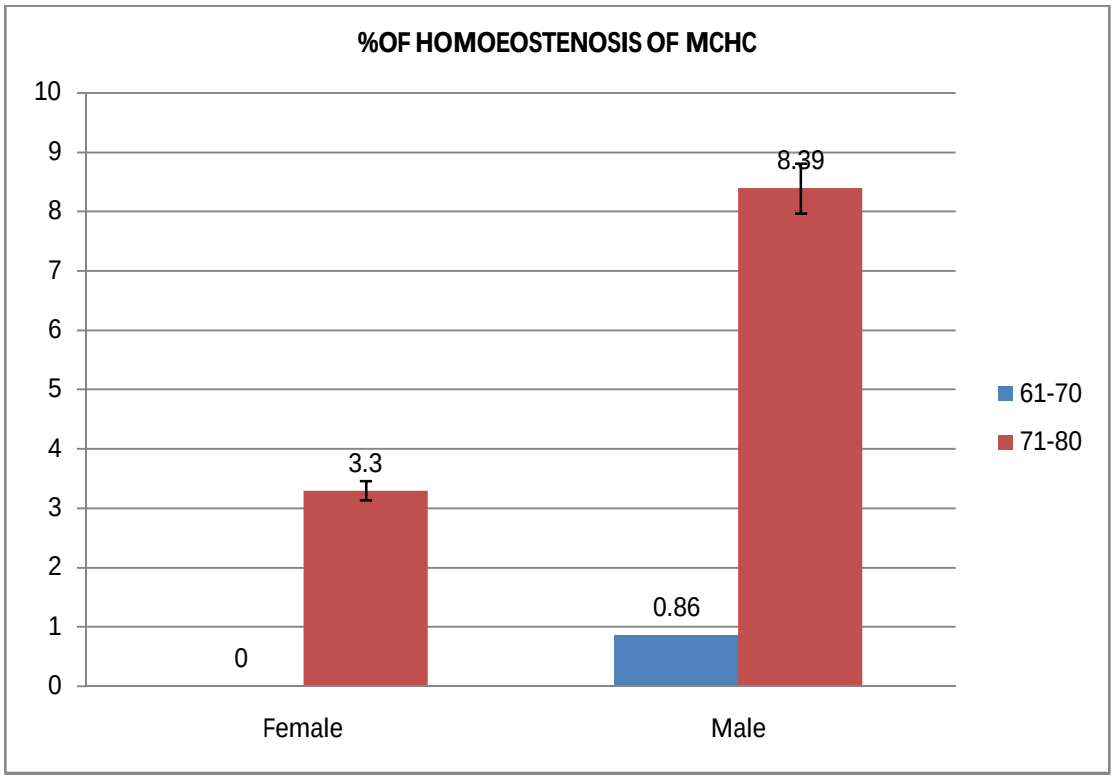
TABLE-1. Demographic & Hematological parameters of elderly males 61-70 yrs. n=50

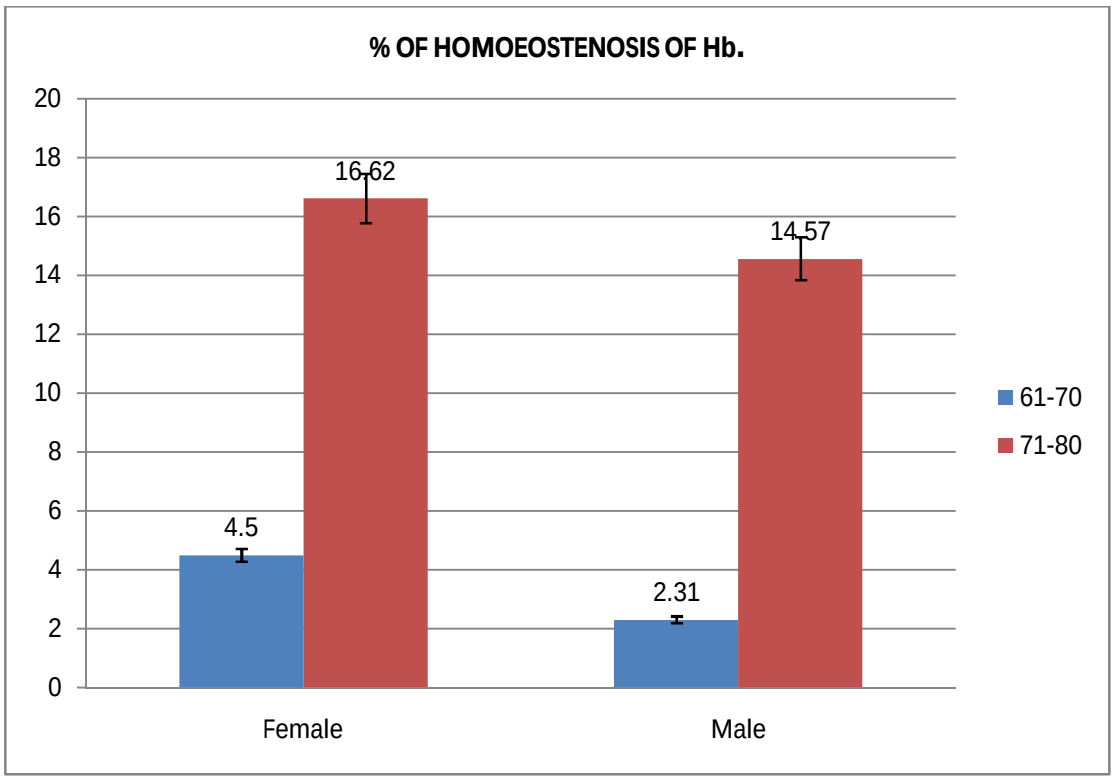
ITEM	AGE YRS.	WT.[Kg.]	HT.[Cms.]	BMI	Hb.-g%	RBC[T] m./ cmm.	WBC[T]Thousand/cmm.	PCV-mm.	MCV µ cube	MCH pg.	MCHC g/dl	RDW	ESR	PLT.CNT. L / cmm.
AV.	65.14	73.32	166.92	26.1	13.68	4.62	6.37	41.76	89.01	29.92	32.51	12.38	10.12	2.6192
S.D.	2.72	12.14	5.06	3.66	1.23	0.47	1.09	4.3	0.47	2.07	0.99	0.94	4.54	0.495

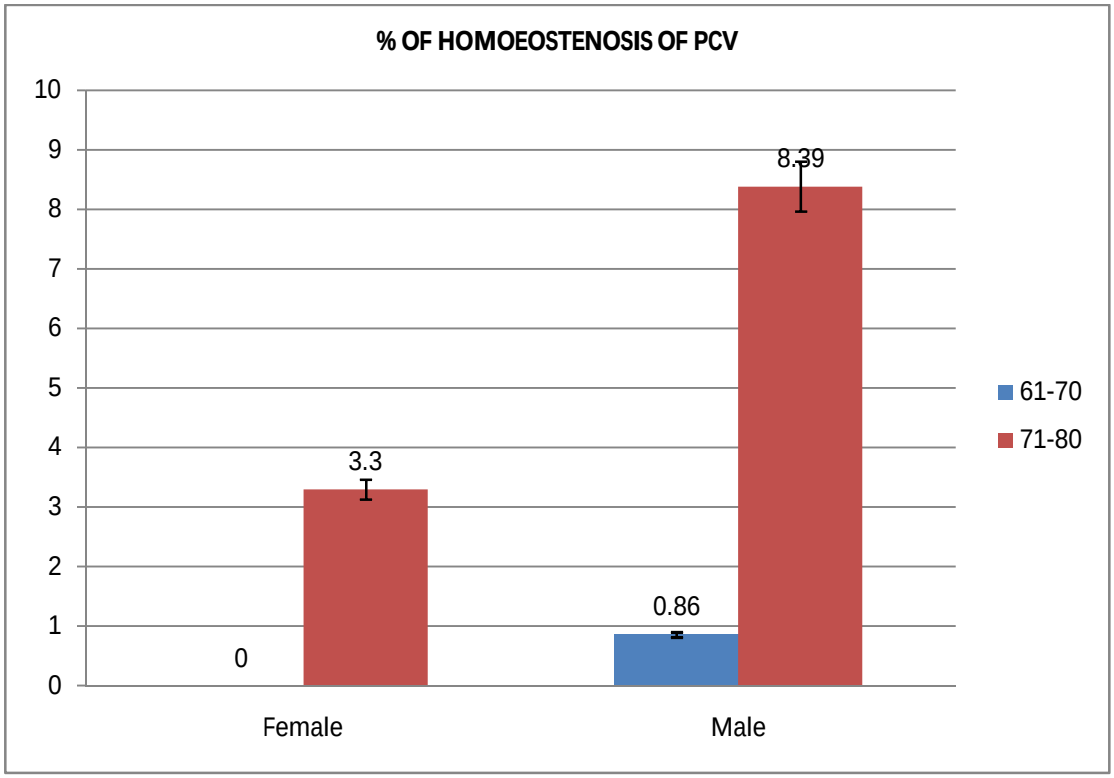
TABLE-2. **Demographic and Hematological parameters of elderly males 71-80 yrs.**

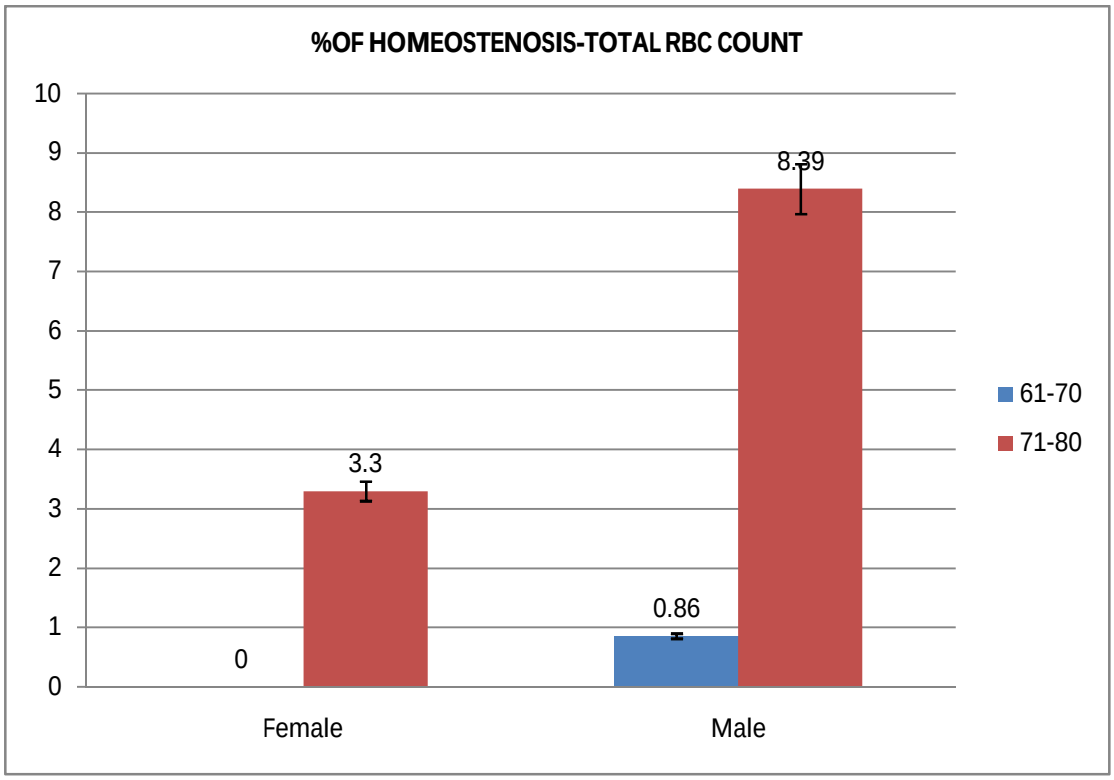
ITEM	AGE yrs	WT.[Kg.]	HT.[Cms.]	BMI	Hb.-g%	RBC[T] m/cmm	WBC[T]thousand/cmm.	PCV-mm.	MCV µcube	MCH Pg.	MCHC g/dl	RDW	ESR	PLT.CNT. L/cmm.
AV.	73.85	64.09	168.09	22.66	12.29	4.07	6742.8	40.37	99.68	30.15	30.04	11.49	9.33	2.729
S.D.	2.05	4.23	6.98	2.14	1.16	0.47	1321	1.23	11.92	2.39	1.84	1.11	1.17	.6067

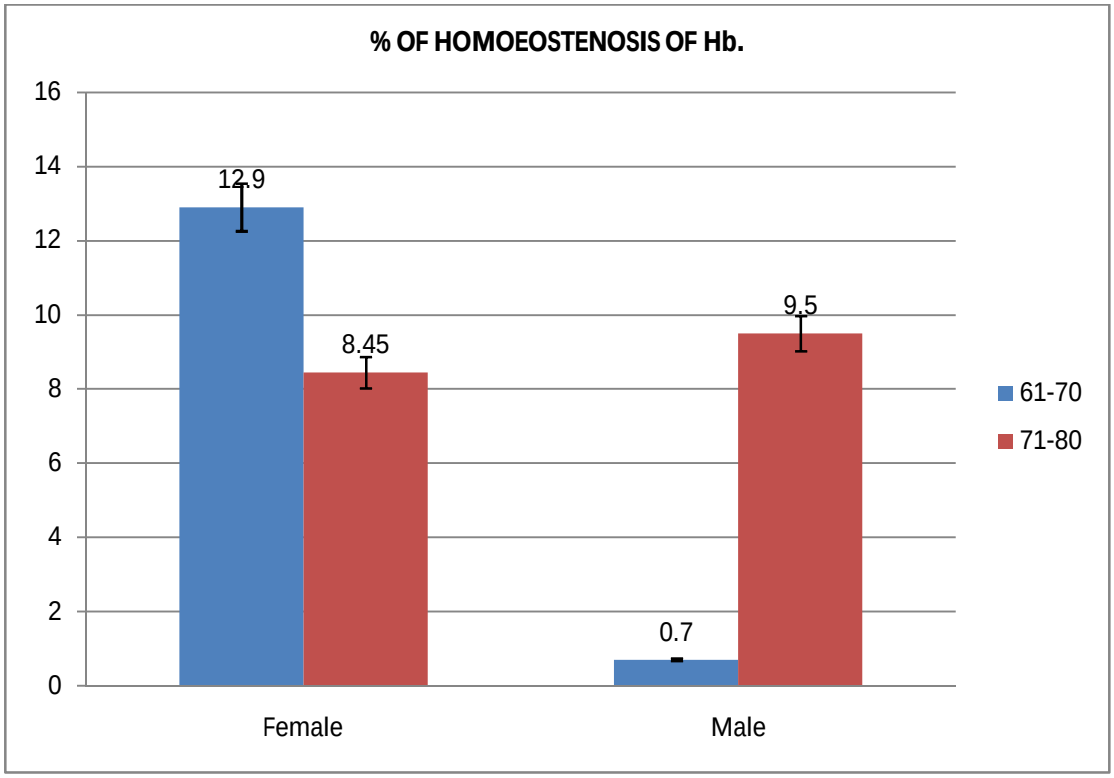
Sr.no.	Subjects	Gender	HB.VALUE [elderly subjects]				TOTAL RBC COUNT [elderly subjects]			
1	70	MALE	Mean	Max.	Min.	S.D.	Mean	Max.	Min.	S.D.
			13.68	16	11	1.23	4.62	5.5	3.7	0.47


%OF HOMOEOSTENOSIS OF MCHC
10
9
8
7
6
5
4
3
2
1
0
8.39
3.3
0.86
0
Female
Male
61-70
71-80


% OF HOMOEOSTENOSIS OF Hb.
20
18
16
14
12
10
8
6
4
2
0
16.62
14.57
4.5
2.31
Female
Male
61-70
71-80


% OF HOMOEOSTENOSIS OF PCV
10
9
8
7
6
5
4
3
2
1
0
8.39
3.3
0.86
0
Female
Male
61-70
71-80


%OF HOMEOSTENOSIS-TOTAL RBC COUNT
10
9
8
7
6
5
4
3
2
1
0
8.39
3.3
0.86
0
Female
Male
61-70
71-80



DISCUSSSION:

The aging changes that influence an organism, may be caused by external agencies or the intrinsic mechanisms and the blood is also influenced by aging. An attempt is made here to assess the hematological values in this biological phenomenon in elderly population of Vadodara.. The diminished functional and structural reserves which are state of homeostenosis are seen by most of the investigators but the values presented somewhat vary in their studied series.

It is mentioned (7) that with advancing age, there is reduction in pleuripotent stem cells in bone marrow. With advancing age, there is reduction in amount of trabecular bone and hemopoiesis is accompanied by increase in fat cells in sub cortical regions.(8) Average marrow cellularities at various sites are presented by Henry, who has also presented normal iliac bone marrow cellularity as given by Hartsock.(9).Also, hemopoiesis has decreased bone marrow reserves in response to high demands.(18).

It is observed that number of physiologic factors affect CBC (Complete Blood Cell) count and one of them is age Anemia is a common condition in older population. (13),here the authors have warned that, yet, taking ,the mild anemia of elderly lightly, may run a potential risk of missing an early clue to an important underlying disorder and which itself is important predictor of morbidity, performance status and mortality as a general risk factor or in states like heart failure.(13).

Chiu Wah Tsang (15) et al have studied the hematologic parameters in BMES(Blue Mount Eye Series) and also presented findings of other investigators with comparable series with large population size.BMES by CHIU WAH TSANG et el. at Uni. of Sydney[1998] group has attempted to establish healthy reference values of Hematological Indices in an older population in very large population[1382 males and 1837 females elderly participants; more over they have also assessed creatinine values. Our sample size was small, comparable to Jarnigan (15) who studied 48women and 25 men and Zauber (15) who has studied blood indices in 50 women and 45 men;[as presented in BMES]. It comes closer to our sample size. The age group as selected by Yipp (15) and Kelly (15) is closer to the age groping as we have done, and the findings of our values in Vadodara elderly are closer to their findings in a number of blood indices.

The assessment of similar parameters is done by Indian authors (6), (11), (12) and their findings also correlate to our observations.

.Vadodara is a favored place for retirement by elderly population but in some pockets there is likelihood for industrial pollution and urban complexities which may be feared to induce detrimental influence on health probably hematological profile.

We tried to assess a selected hematological parameters in Vadodara who were in favored situation as far as life style modification calls for, and as such their overall health related quality of life was good as per their self appraisal. [HRQOL] , barring the hematological changes, none had ADL[Assisted Daily Living] or IADL[Instrumental Assisted Daily Living],and none had a transition for existing to inferior quality of life in last year. The values and patterns in Vadodara elderly are similarly showing homeostenosis in hematological parameters, like, Hb, MCH, RBC Count ,PCV with rise in MCV. Also, changes in females are more significant in elderly group perhaps due to the hormonal and nutritional reasons; although the degree of severity may vary individually but the extent was not critical to degree that may call for

apprehension in unmodified or uncomplicated ageing sample we studied. Elderly population should still be “monitored” for maintenance of quality of life. Indeed the sample size is small, and further study is required for programming for life style modification in elderly individuals.

CONCLUSION:

The blood indices values are diminished in practically most subjects to variable extent as demonstrated by tables; except MCV however, which increased to greater or lesser degrees, as an equivocal observation. Hb and RBC counts are significantly diminished including PCV..As stated earlier these findings correlate well with findings of other studies(12);(16) yet, the sample size being small and as we attempted examining only one area of Vadodara city, observations requires further study, in many different areas of this region having varying patterns eco biology, life style and environment.

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INTREST: Authors have no conflict of interest.

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