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AGEING EFFECTS IN THE MARINE FISHERFOLK OF BENGAL

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Abstract: *The biological sequence of age changes in a sample of coastal fishermen villages in the district of Midnapore, West Bengal, is discussed. The present study shows that soft parts of the nose continue thickening throughout the life as nasal length and breadth increase in both sexes. However, the rate of annual increment or decrement of these and other characters differs by age. Loss of functional capacity and the impairment during cell division in the older age groups are the biological reasons of this difference. The occupational and behavioural patterns of the villagers may also play a vital role in the rate of change in some characters. Out of five metric measurements considered for the present study, stature and biacromial breadth, but not nasal length and breadth, could be functionally related to the occupational behaviour of sea fishing. Weight which is known to be influenced by the nutritional status of the individual may also be related to this type of occupation. No doubt, this type of synthesis can only be possible with the help of longitudinal data which are free from the effect of secular change.*

Key words: *Ageing; Anthropometric changes with age; Marine fishermen; Midnapore/West Bengal.*

Introduction

Developmental changes do not stop after puberty, but continue during adulthood. Ageing is a continuous process where it is difficult to distinguish between effects related only to age and the effects of degenerative diseases. These diseases are the cause or the result of senescence. Individual age changes occur as a function of the environment between limits determined by genetic factors.

Studies of ageing are not easy. It implies, of course, a definition and a choice of a homogeneous sample, such as in all anthropological studies. But, it would imply also a discrimination between chronological and biological age, if determination of objective morphological or physiological changes would be possible.

Moreover, the cross-sectional studies compare non-related individuals grouped on different age classes: the differences observed between these age classes include individual age changes but also the secular evolution of the anthropological characteristics and also the effect of selective mortality. Only the longitudinal studies, where the same individuals are measured different times, allow to observe individual age changes.

Physiological changes

Morphological, physiological and psychological changes of the adults are numerous.

With ageing, the loss of dead cells is not always compensated by mitosis. It results in a phase of negative growth, very clearly observed in the central nervous system, because in this case cell replacement does not occur. Modifications can already be observed after 20 or 30 years of age (Sinclair 1973): time of reaction increases and movement accuracy gradually deteriorates for instance.

Vital capacity reaches a maximum at 20 years and decreases afterwards (Morris et al. 1963). The increase with age in mean serum cholesterol level is also well-known (Abraham et al. 1978), as well as the increase of blood pressure, especially of systolic blood (Roberts et al. 1978), or the diminution of muscle width (Meema et al. 1975).

Osteological changes are also very numerous with age. An imbalanced bone remodeling has been observed; a reduced new bone formation, such as continued periosteal apposition, and less marked reduction in bone resorption, such as decrease in cortical thickness of the tubular bones. It results in skeletal rarefaction (Trotter et al. 1974, Meema et al. 1975) but at the same time in increases of diameters of tubular bones (Dequecker 1972, Semine et al. 1975).

Anthropometric changes

In head dimensions, the patterns of change are related to the osteological changes: skull dimensions are altered by an ectocranial apposition and an endocranial resorption. Outer skull diameters tend to increase, mandibular size too (Isreal 1973, Susanne 1977, 1980). Most transversal studies show an increase of head length and breadth.

The face also continues to grow: increases of face heights and diameters are observed, as well as changes in the morphology of mouth, nose and ears (Susanne 1974, 1980).

In cross-sectional studies of Western populations, weight increases during the first decades of adulthood but decreases very significantly after 60 years. A decrease of stature is observed, as well as of sitting height. A marked increase with age has been observed in biiliac diameter (Susanne 1974, 1980).

Cross-sectional versus longitudinal studies

In cross-sectional studies, differences are not identified with real age changes but secular changes are interfering. Moreover, selective survival must also be taken into account in the interpretation of cross-sectional data.

The longitudinal method is the most suitable for the study of individual age changes, but their numbers are limited. Let us mention for stature Büchi (1950), Lipscomb et al. (1954), Damon (1965), Gsell (1966), Miall et al. (1967), Hertzog et al. (1969), Pariskova et al. (1971), Susanne (1967, 1974, 1977), Borkan et al. (1977).

For other measurements such as weight, length of arm, biacromial diameter, biiliac diameter, arm circumference, head length and breadth, frontal and bizygomatic breadth, nose height, ear and lips height, Susanne (1974, 1977) published longitudinal data.

Individual age changes among the marine fisherfolk of Bengal

Age changes are of course universal but they are mediated by local environmental factors: differences in physical activities can influence senile changes, as well as physical factors (climate, altitude, pollution), nutritional factors, psycho-social factors (Susanne 1986). The present study is done on a sample of a genetically very homogeneous population in very specific environmental conditions: the marine fisherfolk of coastal Midnapore.

Material and methods

The material has been collected by S. Kundu on six villages in the endogamous caste group Jele Kaibartas who are traditionally fisherman by occupation. Middle aged males

go for deep sea fishing, above 45 years of age fisherman retire for deep sea fishing but remain attached with fishing operation in the sea cost, above 55 years of age males have light jobs like repairment of nets. Despite the house hold responsibilities, the female also go for trapping the sea crabs, sea shells and collect dry leaves and wood. Among the males, the percentage of literacy is 17.72%, and among the females it is 5.22%. Most of the families posses a small piece of land where they produce paddy generally once in a year for the household comsumption.

The data were collected on the same individuals in 1980, 1982 and 1984. It means that the comparison of the age groups inside the visit of 1980 for instance results in a cross-sectional analysis. On the contrary, a comparison of the measurements of the same individuals between 1980 and 1984 gives a longitudinal analysis.

Results

Stature: Table 1 shows from the cross-sectional data of 1980 a trend of decline from the sixth decade in males and females. The differences between the measurements of 1980 and 1984 are always negative, the decrease is however not significant. The rate of decrement in mean stature increases with increasing age in both sexes.

Table 1. **Changes of stature (quinquennial groups were defined in 1980) (in cm)**

		Males				*Females*	
Age group	N	transversal 1980	longitud. 1984–1980	Age group	N	transversal 1980	longitud. 1984–1980
35+	22	161.11	-0.04	35+	30	148.73	-0.04
40+	27	164.03	-0.05	40+	39	149.91	-0.12
45+	32	161.38	-0.28	45+	22	147.51	-0.14
50+	29	161.05	-0.13	50+	27	148.86	-0.20
55+	27	162.83	-0.24	55+	25	148.10	-0.24
60+	29	161.00	-0.48	60+	20	146.64	-0.46
65+	26	159.97	-0.49	65+	24	145.48	-0.33
70+	17	157.79	-0.40	70+	18	145.96	-0.40
75+	16	156.80	-0.51	75+	13	144.31	-0.49
80+	9	155.16	-0.66	80+	8	146.75	-0.37

The differences between 1984 and 1980 are not significant

Biacromial breadth: The cross-sectional comparison shows a decline from the 5th decade (Table 2). In longitudinal assessment (1980-1984), a decrease is observed from the 50s, in males an increase is however observed till the late 40s.

Weight: The longitudinal analysis (differences between 1980-84) shows a trend to decline in females (significant in the groups 65+ and 70+) and a trend of increase in males till the late 50s (significant at 40+) and a decrease afterwards (significant at 80+) (Table 3).

Nasal length: Table 4 shows from the results in 1980 the cross-sectional increase from the early 50s. In the longitudinal analysis (1980-84), on early increment is observed in both sexes: this rate is, however, higher in the older age groups in both sexes.

Nasal breadth: Table 5 illustrates more or less the same trend as for nasal length: a clear longitudinal increase, higher in the older age groups.

Table 2. **Changes of biacromial breadth (quinquennial groups were defined in 1980) (in cm)**

Age group	N	*Males* transversal 1980	longitud. 1984–1980	Age group	N	*Females* transversal 1980	longitud. 1984–1980
35+	22	37.96	+0.44	35+	30	33.19	-0.04
40+	27	37.94	+0.27	40+	39	33.68	-0.06
45+	32	38.18	-0.07	45+	22	33.11	-0.05
50+	29	37.40	-0.08	50+	27	33.00	-0.08
55+	27	37.11	-0.13	55+	25	32.69	-0.12
60+	29	36.78	-0.39	60+	20	32.51	-0.23
65+	26	36.65	-0.26	65+	24	32.19	-0.22
70+	17	35.92	-0.44	70+	18	31.26	-0.31
75+	16	35.07	-0.29	75+	13	30.98	-0.28
80+	9	34.19	-0.51	80+	8	31.49	-0.29

The differences between 1984 and 1980 are not significant

Table 3. **Changes of weight (quinquennial groups were defined in 1980) (in kg)**

Age group	N	*Males* transversal 1980	longitud. 1984–1980	Age group	N	*Females* transversal 1980	longitud. 1984–1980
35+	22	50.94	+2.31	35+	30	34.62	-0.48
40+	27	50.00	+3.00*	40+	39	39.72	-1.60
45+	32	48.00	+0.30	45+	22	37.96	-0.27
50+	29	48.38	+0.62	50+	27	38.30	-0.85
55+	27	50.28	+3.96	55+	25	36.57	-0.87
60+	29	46.20	-3.27	60+	20	36.55	-1.55
65+	26	47.66	-1.60	65+	24	35.63	-2.13*
70+	17	43.53	-0.87	70+	18	40.50	-1.74*
75+	16	45.00	-1.73	75+	13	32.93	-2.93
80+	9	45.00	-2.50*	80+	8	30.87	-1.00

*Significant at the level of < 0.5

Table 4. **Changes of nasal length (qulinquennial groups were defined in 1980) (in cm)**

Age group	N	*Males* transversal 1980	longitud. 1984–1980	Age group	N	*Females* transversal 1980	longitud. 1984–1980
35+	22	4.84	+0.02	35+	30	4.40	+0.03
40+	27	4.73	+0.03	40+	39	4.70	+0.03
45+	32	4.84	+0.04	45+	22	4.62	+0.03
50+	29	4.81	+0.03	50+	27	4.76	+0.04
55+	27	4.96	+0.05	55+	25	5.00	+0.10
60+	29	4.96	+0.11	60+	20	5.09	+0.06
65+	26	4.96	+0.14*	65+	24	5.18	+0.13*
70+	17	5.09	+0.13	70+	18	5.21	+0.13
75+	16	5.20	+0.14	75+	13	5.24	+0.17
80+	9	5.22	+0.18	80+	8	5.21	+0.19

*Significant at the level of < 0.5

Table 5. **Changes of nasal breadth (quinquennial groups were defined in 1980) (in cm)**

Age group	N	*Males* transversal 1980	longitud. 1984–1980	Age group	N	*Females* transversal 1980	longitud. 1984–1980
35+	22	3.78	+0.02	35+	30	3.40	+0.04
40+	27	3.79	+0.02	40+	39	3.45	+0.03
45+	32	3.73	+0.04	45+	22	3.50	+0.03
50+	29	3.90	+0.06	50+	27	3.51	+0.06
55+	27	3.93	+0.07	55+	25	3.84	+0.09
60+	29	3.70	+0.07	60+	20	3.83	+0.10*
65+	26	3.75	+0.14	65+	24	3.58	+0.11*
70+	17	3.92	+0.14*	70+	18	3.65	+0.13*
75+	16	4.00	+0.14	75+	13	3.82	+0.15*
80+	9	3.97	+0.15	80+	8	3.74	+0.24*

*Significant at the level of < 0.5

Discussion

With this longitudinal analysis, we expected to avoid the usual error in the interpretation of cross-sectional data, namely the interaction with secular changes and with selective death.

We expected also that in the genetically homogeneous group we considered here, the rate of change with age would be a function of environmental factors, and that ageing in this marine fisherfolk of Bengal would show sometimes similarity with the general trend observed in other populations and other times variations related to the specific environment of this population.

We could predict that nasal length and breadth would not be affected by this specific ecological background. Indeed our results are similar, in cross-sectional and longitudinal evolution, with data already published (Susanne 1974, 1977). These ageing modifications could be due to the growth of the nasal cartilage and to fat deposits, too. Macho (1986) showed also a continuous increase with age of the thickness of the soft tissues along the face.

A decrease of stature is observed: this confirms results observed in other longitudinal studies (Susanne 1980). But the decrease is continuously observed from 35 years of age, in other populations the decrease is sometimes observed later on. Ecological factors may be implicated. Borkan et al. (1980) showed also that men considered as active following physical activity variables were biologically younger than inactive men.

Weight and biacromial diameter show an influence of the local environmental factors at the level of a sexual difference in ageing rate and at the level of an acceleration in the rate of decline from about 50 years of age in the male groups. During long term deep sea fishing, the males consume very high amount of sea fish (3.6 kg/day) rich in protein for instance. A slower rate of decline is observed during this period in males than in females. The change in life-style after retirement accelerates the ageing process. In females, the changes occur regularly from 35 years of age, their life-style is less dynamic, and does not change very much with age both behaviourally and nutritionally.

The increase in weight till the late 50s in man compared to the regular decrease in females may be also explained by the local ecological conditions. The male situation is similar to the results observed in populations with good nutritional conditions, there

where the female situation is similar to the evolution observed in populations with unsatisfactory conditions (Susanne 1974, 1980).

The trend of the changes of biacromial diameter is raqther similar to this of weight. The literature confirms that before 55 years of age changes are almost absent but that a decrease is systematically observed after that age (Susanne 1971, 1974, 1977).

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