



A GENETIC DEMOGRAPHIC PROFILE OF SALIS IN ANDHRA PRADESH, SOUTH INDIA

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Article Received on 29/11/2017

Article Revised on 19/12/2017

Article Accepted on 09/01/2018

ABSTRACT

Salis is a Telugu weavers' caste or social group found largely in the state of Andhra Pradesh in India. They are identified by different names in various regions throughout India. Salis are categorized into two endogamous sub-castes, the Padmasalis and Pattusalis. The main objective of the study is to characterize the Sali population and to assess the relative roles of fertility and mortality differentials. Data from 520 families of Sali community, residing in and around Visakhapatnam and Vizianagaram districts are recruited for the study. Data on demographic variables and reproductive history of woman were collected. The data was processed and analyzed by using software SPSS V.19. Both the Padmasalis and Pattusalis are found to be growing populations. The distorted tertiary sex ratios indicate that there is considerable migration of the males from the rural to the urban areas. The higher contribution of fertility component to the total index among the two subgroups supports the contention that due to lack of better living conditions and proper medical care, there has been a decrease of deaths among offspring, thereby enhancing the fertility component. The population pyramids are broad at the base and gradually narrow down at the peak, indicating the Padmasalis and Pattusalis are growing populations. The mean ages at menarche, marriage, first conception and menopause are found to be high among the PS-I than among the PS-II. The data is compared with the available caste populations of Andhra Pradesh, South India.

KEYWORDS: Genetic Demography, Sali community, Sub-populations, Fertility and Mortality, South India.

INTRODUCTION

Population genetics examines the nature and extent of genetic variations within and between the populations. Much of population genetic study is aimed at understanding the evolutionary causes of the observed genetic variations. Population geneticists attempt to understand biological variations among different populations distributed in different geographical regions with varied socio-economic and cultural backgrounds employing a variety of qualitative characters. The demographic datum is the basic element of work for the population geneticist.^[1] Marriage, fertility, migration, mortality and morbidity represent the most relevant sectors where overlapping of interest occurs between demography and population genetics. Socio-economic and cultural variables, acting side by side with biological factors, may inflate or reduce the magnitude of an effect apparently only due to biological causes.

An understanding of the fertility and mortality trends would be of immense value in any demographic study. Fertility and mortality are the prime factors controlling the growth of a population indirectly influencing the economic development of a country. A significant

decline in the rate of population growth requires quick acceptance of the family planning programmes by the public. Fertility patterns even in the absence of deliberate controls may be altered by numerous changes in the social structure and social norms. Fertility levels are lower in more developed nations than in less developed nations. Furthermore, the experience of the more developed countries has been that, fertility declines with modernization. Industrialization and urbanization with their accompanying increased economic opportunities, higher levels of education, health and security and re-organization of the family are the major structural factors cited as influencing the negative relationship between fertility and modernization.^[2,3,4] Therefore, in the present study, the general fertility and mortality trends and opportunity for selection which are essentially based on the fertility and mortality trends, are analyzed.

The present population genetic study was done on a caste population, known as Salis, which is categorized into two endogamous sub-castes, the Padmasalis (PS-I) who deal with cotton weaving and Pattusalis (PS-II) who are skilled silk weavers. Both the subgroups are distributed throughout Andhra Pradesh. The main objective of the

present study is to assess the genetic composition of these two subgroups and the extent of genetic differentiation among them with the help of various demographic and genetic variables.

MATERIALS AND METHODS

A total of 520 households belonging to two sub-groups of Sali caste (PS-I: 265; PS-II: 255) residing in and around Visakhapatnam and Vizianagaram districts of Andhra Pradesh, India have participated in this study. The data were collected through interviewing the eldest female member in the family to elicit the required information using a structured questionnaire. The demographic information regarding age, personal details, occupation, economic status, fertility and mortality were collected. Also, information about the marriage type, i.e. consanguineous or non-consanguineous marriage was recorded by constructing pedigrees. Data on reproductive history of woman, which includes the age of women at different stages of reproductive period, outcome of each pregnancy, i.e., abortions, still births, live births and

postnatal deaths and sex of all children (dead or alive) were collected. The data was processed and analyzed by using software SPSS V.19.

RESULTS

Data obtained from 265 households of PS-I showed that the males (781) outnumber the females (777) (Table 1). Children below 10 years of age account for about 21.5 percent, which constitutes relatively large proportions, followed by the adolescents in 11-20 years (18.0 percent), potential reproductive stage of 21-30 years (19.3 percent) and middle ages of 31-40 years (18.4 percent). More number of females were observed in the age group of 21-40 years and more males were observed in the age group of 0-10 years, indicating there might have higher male births than female births in that birth cohort. Among the people surviving during the period of survey, females and males are almost equal numbers. The tertiary sex ratio revealed the existence of equal proportion of males and females in PS-I.

Table 1: Age and sex wise distribution and tertiary sex ratio among surviving members of PS-I.

Age groups	Males		Females		Males + Females		Tertiary sex ratio
	Number	Percent	Number	Percent	Number	Percent	
0-10 years	181	23.2	154	19.8	335	21.5	117.53
11-20 years	137	17.5	143	18.4	280	18.0	95.80
21-30 years	134	17.2	166	21.4	300	19.3	80.72
31-40 years	146	18.7	170	21.9	286	18.4	85.88
41-50 years	91	11.7	75	9.7	166	10.7	121.33
51-60 years	59	7.6	35	4.5	94	6.0	168.57
61-70 years	27	3.5	31	3.9	58	3.7	87.10
70+	06	0.8	03	0.4	09	0.6	200.00
Total	781	100.00	777	100.00	1558	100.0	100.51

Table 2 represents data collected from 255 households of PS-II showed that the males (748) outnumber the females (656). Children below 10 years of age account for about 25.7 percent, which constitutes relatively large proportions, followed by the adolescents in 11-20 years (18.2 percent); potential reproductive stage of 21-30 years (18.5 percent) and middle ages of 31-40 years

(18.2 percent). More number of females were observed in the age group of 21-30 years. The results suggest that the death rate of female might be higher after attaining 50 years. Among the people surviving during the period of survey, females and males are almost equal numbers. The tertiary sex ratio revealed the existence of slightly higher proportion of males to females in PS-II.

Table 2: Age and sex wise distribution and tertiary sex ratio among surviving members of PS-II.

Age groups	Males		Females		Males + Females		Tertiary sex ratio
	Number	Percent	Number	Percent	Number	Percent	
0-10 years	192	25.7	169	25.8	361	25.7	113.61
11-20 years	128	17.1	127	19.4	255	18.2	100.79
21-30 years	119	15.9	140	21.3	259	18.5	85.00
31-40 years	149	19.9	106	16.2	255	18.2	140.57
41-50 years	67	8.9	47	7.2	114	8.1	142.55
51-60 years	45	6.0	35	5.3	80	5.7	128.57
61-70 years	29	3.9	22	3.4	51	3.6	131.82
70+	19	2.5	10	1.5	29	2.1	190.00
Total	748	100.00	656	100.00	1404	100.00	114.02

Table 3 depicts the data collected from 520 households of Sali population showed that males account for 1529 members and females account for 1433 members.

Relatively large proportions (23.5 percent) of the children are in the age group 0-10 years, followed by middle ages of 31-40 years (19.3 percent), potential

reproductive stage of 21-30 years (18.9 percent) and the adolescents who are in the age group of 11-20 years (18.1%). About 5.0 percent are in the 60+ years age

group. The tertiary sex ratio revealed the existence of higher proportion of males to females.

Table 3: Age and sex wise distribution and tertiary sex ratio among surviving members of salis.

Age groups	Males		Females		Salis (Pooled)		Tertiary sex ratio
	Number	Percent	Number	Percent	Number	Percent	
0-10 years	373	24.4	323	22.5	696	23.5	115.5
11-20 years	265	17.3	270	18.8	535	18.1	98.1
21-30 years	253	16.5	306	21.4	559	18.9	82.7
31-40 years	295	19.3	276	19.3	571	19.3	106.9
41-50 years	158	10.3	122	8.5	280	9.5	129.5
51-60 years	104	6.8	70	4.9	174	5.9	148.6
61-70 years	56	3.7	53	3.7	109	3.7	105.7
70+	25	1.6	13	0.9	38	1.3	192.3
Total	1529	100.0	1433	100.0	2962	100.0	106.7

Table 4 shows the details of ages at menarche, marriage, first conception and menopause among the two sub-groups of Sali women. The mean ages at menarche, marriage, first conception and menopause are found to be high among the PS-I than among the PS-II. Considering pooled data, the mean menarche for pooled Salis is 12.76 ± 0.06 years, which can be considered to be early. The mean age at marriage for pooled Salis with an average of 15.99 ± 0.13 years. This mean age of marriage infers that the Sali girls get married approximately three years after

they attain menarche (mean menarche age 12.76 ± 0.06 years), which is not even a minimum mandatory marriage age for girls in India. The mean age at first conception for pooled Salis with an average of 17.90 ± 0.17 years, which indicated that Sali women deliver within 2 years after marriage. The mean age of menopause for pooled salis with an average of 46.18 ± 0.34 .

Table 4: Details of ages at women's reproductive events among Salis women.

Age at event	Mean $\pm$ SE (years)		
	PS-I	PS-II	Pooled
Age at menarche	13.10 ± 0.09	12.41 ± 0.07	12.76 ± 0.06
Age at marriage	17.05 ± 0.17	14.81 ± 0.19	15.99 ± 0.13
Age at first conception	19.02 ± 0.23	16.71 ± 0.24	17.90 ± 0.17
Age at menopause	46.64 ± 0.43	45.56 ± 0.52	46.18 ± 0.34

PS I: t - Value for intergroup difference: 5.9180: $p > 0.001$

PS II: t - Value for intergroup difference: 5.1823: $p > 0.001$

Fertility and Mortality in consanguineous and non-consanguineous types in both the population and statistical constants are presented in Tables 5 and 6. The mean numbers of conceptions are more among the PS-I than among the PS-II and the difference is statistically significant. Abortions are more among the PS-I while stillbirths are more among the PS-II. The differences between the two groups are statistically significant. Live births are more among the PS-I than among the PS-II and

the difference is significant. Postnatal deaths are more among the PS-II than among the PS-I group. However, the difference is not significant. The prenatal deaths, which include abortions and still births, are more among the consanguineous marriages among the PS-I as well as the PS-II. Postnatal deaths are more among the non-consanguineous group among the PS-II, while it is almost the same among the PS-I.

Table 5: Fertility, mortality and marriage type in the present study population.

Fertility and Mortality events	PS-I					PS-II				
	Affinal (167)	Consang (98)	Total		t-value	Affinal (173)	Consang (32)	Total		t-value
	No. (%)	No. (%)	No.	$\bar{X} \pm S.E$		No. (%)	No. (%)	No.	$\bar{X} \pm S.E$	
Conceptions (A)	620	446	1066	4.05±0.07	1.60; 0.20p>0.10	584	341	925	3.66±0.14	0.38; 0.80p>0.70
Abortions (B)	22 (3.6)	33 (7.4)	55	0.21±0.05	-	20 (3.4)	14 (4.1)	34	0.13±0.04	-
StillBirths (B)	18 (2.9)	20 (4.5)	38	0.14±0.03	-	34 (5.8)	19 (5.6)	53	0.21±0.03	-
Prenatal deaths (A+B)	40 (6.5)	53 (11.9)	93	0.36±0.01	2.22; 0.05>p>0.02	54 (9.3)	33 (9.7)	87	0.34±0.05	0.06; p>0.90
Live births	580 (93.6)	393 (88.1)	973	3.70±0.13	0.71; 0.50>p>0.40	530 (90.8)	308 (90.3)	838	3.31±0.13	0.43; 0.70>p>0.60
Neonatal deaths (C)	6 (1.0)	11 (2.8)	17	0.06±0.02	-	12 (2.3)	10 (2.9)	22	0.01±0.02	-
Infant deaths (D)	21 (3.6)	9 (2.3)	30	0.11±0.00	-	20 (3.4)	11 (3.6)	31	0.12±0.02	-
Juvenile deaths (E)	16 (2.8)	10 (2.5)	26	0.10±0.02	-	22 (4.2)	5 (1.6)	27	0.11±0.02	-
Pre reprod deaths (F)	5 (0.9)	4 (1.0)	09	0.03± 0.01	-	17 (3.2)	3 (1.0)	20	0.08±0.03	-

Table 6: Statistical constants among consanguineous and non-consanguineous marriages among Salis.

Fertility & Mortality events	PS-I			PS-II		
	Consag (98)	Affinal (167)	t-value	Consag (82)	Affinal (173)	t-value
Conceptions	4.33 ± 0.22	3.88 ± 0.18	1.60; 0.20p>0.10	3.59 ± 0.21	3.70 ± 0.19	0.38; 0.80>p>0.70
Prenatal deaths	0.51 ± 0.10	0.25 ± 0.06	2.22; 0.05>p>0.02	0.35 ± 0.08	0.34 ± 0.06	0.06; p>0.90
Live births	3.82 ± 0.21	3.65 ± 0.17	0.71; 0.50>p>0.40	3.24 ± 0.20	3.35 ± 0.17	0.43; 0.70>p>0.60
PostNatal deaths	0.33 ± 0.08	0.30 ± 0.05	0.32; 0.80>p>0.70	0.31 ± 0.08	0.46 ± 0.07	1.50; 0.20>p>0.10

Table 7 shows the total index of opportunity for natural selection according to the Crow's Index method and Johnston and Kensinger's Index with fertility and mortality components among the two groups of Salis. The values of selection intensity index (I) recorded in both the subgroups are PS-I: 0.3629; PS-II: 0.5625. The pooled Salis record a value of 0.4411 as selection intensity index. The contribution to the total index of selection due to fertility component is higher in both the subgroups (PS-I: 0.2458; PS-II: 0.3352). The pooled data on Salis also shows higher fertility component (FC = 0.2798). The percentage of fertility component to total

selection in PS-I is 67.79 and PS-II is 59.59. The pooled data recorded a value of 63.43%. When the mortality component is divided into prenatal and pre-reproductive deaths in PS-I a higher value of 0.0856 for prenatal deaths was noticed than that of pre-reproductive deaths (0.0799). But in the case of PS-II, a higher component of pre-reproductive deaths is recorded (0.1561) than that of prenatal deaths (0.0879). The pooled data recorded prenatal and pre-reproductive values of 0.1465 and 0.1151 respectively. The increased rate of postnatal deaths in PS-II reflects the low level of living standards which is in accordance to their low economic profile.

Table 7: Opportunity for Natural Selection among Salis.

Population	No	Crow's Index				Johnston and Kensinger's Index				
		Im	If/Ps	I	FC %	Ime	Imc	I	If/Pb*Ps	FC %
Padmasalis	120	0.1168	0.2458	0.3629	67.79	0.0856	0.0799	0.4334	0.2679	61.81
Pattusalis	95	0.2263	0.3352	0.5625	59.59	0.0879	0.1561	0.6086	0.3646	59.91
Pooled	215	0.1613	0.2798	0.4411	63.43	0.1465	0.1151	0.5859	0.3209	54.77

DISCUSSION

The age and sex composition are of fundamental importance in any demographic study and these trends effect on fertility, mortality, migration and marriage patterns. Sex ratio of any population is affected by its past fertility, mortality and migration. The Sali is a growing population with excess number of children, moderate number of middle-aged people and lesser proportion of old people indicating that dependent people are relatively few.

The tertiary sex ratio indicates the number of females per 100 males among surviving males and females. The tertiary sex ratio of all living Sali individuals (males and females) in both the subgroups (PS-I = 100.51; PS-II = 114.02) as well as pooled Salis (110.97) indicates an excess of males than females in the population. The population of state of Andhra Pradesh also reported similarly (992 females per 1000 males). It is interesting to note that majority of Andhra castes and urban populations show slightly higher number of males than females.^[5,6]

The mean age at menarche among Salis is 12.76 years which can be considered to be early. The mean menarcheal age among different castes of Andhra Pradesh ranges from 12.76 years among Viswabrahmins^[7] to 14.76 years among Telagas.^[8] Factors like nutrition and heredity may be responsible for such variations. The mean age at marriage is lowest (13.32 years) among Madiga - I females^[9] and is highest (17.91 years) among Kalingas.^[10] The present study of Salis records highest values in both the sub groups of Salis as well as pooled data in Andhra Pradesh. This mean age of marriage infers that the Sali girls get married (16 years) approximately three years after they attain menarche (mean menarcheal age 12.76 years), which is not even a minimum mandatory marriage age for girls in India. The mean age at first conception ranges from 17.92 years (Yadava).^[11] to 21.84 years

(Kalinga).^[10] Women belonging to the present Sali community had their first child during 18-19 years of age on an average. The mean age at menopause is recorded to be low among Palle (41.21 years) and Pattapu (41.58 years) caste groups^[12], highest among Mala (48.98 years)^[13] and Brahmins (48.16 years).^[14] The present study Salis fall well within the range of values. However, when compared between the two sub groups, the mean ages at menarche, marriage, first conception and menopause are found to be high among the Padmasalis than among the Pattusalis.

The mean fertility among different castes of Andhra Pradesh ranges from 2.38 children among Trivarnikas^[15] to 5.73 children among Vadabalijas. The present study on Salis fall well within the range of mean fertility values. The lower values of mean fertility rate among Salis, compared to a number of other populations of Andhra Pradesh is clearly due to the popularity of family planning measures among them. The higher contribution of fertility component to the total index among the two subgroups supports the contention that due to better living conditions and proper medical care, there has been a decrease of deaths among offspring, thereby enhancing the fertility component. A similar condition is observed in Rellis^[16] as well as in most of the other caste population like Kalings, Vysya, Thrivarnika, Madiga -I, Madiga -III & Mala-I from Andhra Pradesh. The 'I' values in different castes of Andhra Pradesh ranged from 0.2817 among Rajakas^[6] to 1.6900 among Mala-II (Rao & Murthy, 1984). The fertility component in the present study occurs in intermediate position. The opportunity for natural selection (Johnston & Kensinger's Index is observed to be higher among Madiga-I^[13] and lowest among Rajaka.^[6]

CONCLUSION

The population pyramids are broad at the base and gradually narrow down at the peak, indicating the PS-I and PS-II are growing populations. The mean ages at

menarche, marriage, first conception and menopause and found to be high among the PS-I than among the PS-II. The subgroups of Salis in the present study belong to low socio-economic conditions with high rate of consanguineous marriages within the endogamous groups. Considering fertility and mortality, live births are more among the PS-I whereas prenatal and postnatal deaths are more among the PS-II. The index of selection due to fertility component is more than mortality component in both the subgroups. The higher contribution of fertility component to the total index among the two subgroups supports the contention that due to better living conditions and proper medical care, generally supposed to exist in an urban environment compared to rural. There has been a decrease of deaths among offspring of Salis thereby enhancing the fertility component. Thus, the demographic and reproductive structure of the Salis in the present study indicates that observations made with regard to most of the variables fall well within the ranges observed for other caste populations of Andhra Pradesh. However, there is a lack of awareness and knowledge about the ill effects of consanguinity. Health education and genetic screening were suggested to curb consanguineous marriages in order to prevent adverse outcomes for better health.

ACKNOWLEDGEMENTS

The authors wish to thank the respondents who willingly participated in the study.

Funding: No funding sources.

Conflict of interest: There are no conflicts of interest.

Ethical approval: The study was approved by the Institutional Ethics Committee.

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