ASSOCIATION OF EDUCATIONAL, OCCUPATIONAL STATUS AND RELIGION WITH CONSANGUINITY

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ABSTRACT

BACKGROUND

It is widely perceived that consanguinity is more prevalent among the underprivileged in the society. In general, consanguinity is influenced by geographic, demographic, religious, cultural and socio-economic factors. Consanguineous marriage is widely practiced in India particularly, in traditional Muslim communities and Hindu communities in South India. In present study, an effort has been made to study the association between educational and occupational status of parents and their religion with the occurrence of consanguineous marriages.

AIM AND OBJECTIVES

To determine the association of educational and occupational status of parents and their religion with occurrence of consanguineous marriages.

MATERIALS AND METHODS

The present study is subset of my previous study, which was done retrospectively in Government Medical College and Civil Hospitals of Western Maharashtra between 1st Oct. 2011 till 31st May 2012. A total of 182 congenitally defective live births and stillbirths admitted in above hospitals in same period were studied against total deliveries taken place. Information was collected by using questionnaires and pedigree charts were formed. Information about consanguinity, degree of consanguinity, parental education, parental occupation, religion, etc. was obtained. Data obtained was statistically analysed.

RESULTS

1. Incidence of congenital anomalies is 1.16%.
2. Consanguineous marriages and offsprings with congenital defect are more common among parents who are educated up to primary and secondary education level.
3. Consanguineous marriages and offsprings with congenital defect are more common among parents of low socio-economic status, i.e. mothers who are housewives and fathers who are farmers.
4. Frequency of consanguineous marriage was found more in Muslims than Hindus.

DISCUSSION AND CONCLUSION

1. Incidence of congenital anomalies is 1.16%.
2. Consanguineous marriages and offsprings with congenital defect are found to occur more commonly to parents with primary and secondary education.
3. Consanguineous marriages and offsprings with congenital defect occur more commonly to parents of low socio-economic status, i.e. mothers who are housewives and fathers who are farmers.
4. Frequency of consanguineous marriage is found more in Muslims than Hindus.

KEYWORDS

Consanguinity, Congenital Defect, Congenital Anomaly, Congenital Malformation, Consanguineous Marriage.

INTRODUCTION

Consanguineous marriages are union between two people who share at least one recent common ancestor.[1] In clinical genetics, a consanguineous marriage is commonly defined as union between subjects related as second cousin or closer, equivalent to an inbreeding coefficient in their progeny of $F \geq 0.0156$.[2] It is widely perceived that consanguinity is more prevalent among the underprivileged in the society.[3-5] In general, consanguinity is influenced by geographic, demographic, religious, cultural and socio-economic factors.[6]

The highest rate of consanguineous unions is associated with low socio-economic status, low education and living in rural areas.[5,7-11] India is composed of thousands of sub-populations divided by geography, language, religion and caste or boundaries.[12]

Consanguineous marriage is widely practiced here and reasons given are geographic, settling economic or inheritance problems, prospective mates knowing each other well, he (or she) is the only possible mate.[13]

From a genetic perspective, consanguineous marriage increases the chances that both members of the union will carry recessive variants passed through the family, which increases the chance that their offspring will be affected by a recessive disease.[2]

Consanguineous marriage is widely practiced in India, particularly in traditional Muslim communities and Hindu communities in South India.[14-15]

In my previous study, it was clearly observed that increased frequency of offsprings with congenital defect were

born to consanguineous couples. In present study, an effort has been made to study the association between educational and occupational status of parents and their religion with the occurrence of consanguineous marriages.

MATERIALS AND METHODS
The present study is subset of my previous study, which is retrospective in nature and conducted in Government Medical College and Hospital in Western Maharashtra. Before starting the study, prior permission of Professor and Head of Department of Anatomy, Obstetrics and Gynaecology and Paediatrics of college mentioned above was taken. Approval of Ethical Committee was also acquired.

182 new births with congenital defect of any system of human body born in or referred to the above hospitals including stillbirths and abortions during the period between 1st October 2011 and 31st May 2012 were included in the study.

At the time of birth or referral the outcome of conception, i.e. abortion, intrauterine death, live birth, neonatal death, stillbirth with any congenital malformation was termed as Proband.[16]

Before taking the history, informed consent of parents of proband was taken using the consent form and the information was kept confidential.

Patient's history was recorded using the proforma/questionnaire, especially designed for the study in Marathi and English by meeting the parents of proband in person. Proband whose history was insufficient and in which the follow-up of parents could not be done were removed from the study.

The proforma/questionnaire for history taking included detailed information regarding type of congenital defect, history of consanguineous relationship between the parents and degree of consanguinity, education and occupation of both the parents, religion of parents. Pedigree charts were prepared in all the cases.

All the probands studied were compared with respect to their parental education, occupation, religion, presence of consanguineous relationship in parents and degree of consanguinity and accordingly classification of probands was done.

For classification according to parental education, five categories of parental education were created as illiterate, i.e. having none/zero years of education; primary and secondary education, i.e. between 0 to 8 yrs. after age of 5 years; SSC passed, i.e. between 9-10 yrs. of education; HSC passed, i.e. between 11-12 yrs. of education; and graduate and above, i.e. beyond 13 yrs. of education (S. Harlap et al study).[17]

For classification according to parental occupation, three categories of paternal occupation were created as Unemployed, Farming and Employed; in maternal occupation categories were housewife, farming and employed. For religion, Hindu and Muslim were two categories.

Data collected has been tabulated and shown by using bar diagrams and pie chart.

The findings were then statistically analysed using Pearson chi-square test and "p value" determined. Statistical significance of each finding was mentioned below each table, which were then discussed with other comparable studies done previously by authors within or outside India and final conclusions were drawn from the present study.

OBSERVATIONS AND RESULTS
It is found that in the period between 1st October 2011 and 31st May 2012, total deliveries taking place in Government Medical College and both civil hospitals were 10,114 including (Normal and caesarean section) and total admissions of anomalous births in the NICU were 182, hence incidence of congenital defects calculated is 1.79%.

| | Category of Education | Consanguinity | | Total |
		Yes	No	
Maternal education	Illiterate	3	26	29
	Primary & secondary	23	48	71
	SSC	6	20	26
	HSC	6	13	19
	Graduate & above	10	27	37
Total		**48**	**134**	**182**
Table 1: Maternal Education and Consanguinity				

In Table 1.[17] maternal education and occurrence of consanguineous cases are compared and it shows that out of all 182 cases, 71 cases belonged to mother who are primary and secondary level educated, which is 39.01%.

Also in consanguineously related couples, i.e. 48 cases of all 182 cases, largest cases 23 cases belonged to primary and secondary education level group which are 47.91%.

| | Category of Education | Consanguinity | | Total |
		Yes	No	
Paternal education	Illiterate	5	16	21
	Primary & secondary	13	34	47
	SSC	7	31	38
	HSC	11	27	38
	Graduate & above	12	26	38
Total		**48**	**134**	**182**
Table 2: Paternal Education and Consanguinity				

Table 2 shows correlation between Paternal education and occurrence of consanguineous cases, which shows highest no. of cases, 47 out of 182 total cases studied belonged to primary and secondary level educated fathers which is 20.87%.

Table 2 also shows that among the consanguineous cases (48 cases), highest no. of cases 13 out of 48 total consanguineous cases were born to fathers who were primary and secondary level educated which is 27.08% followed by graduate and above group and HSC educated group which is 25% and 22.9% respectively.

| | Category of Occupation | Consanguinity | | Total |
		Yes	No	
Maternal occupation	Housewife	38	114	152
	Farmer (Self-employed)	5	2	7
	Employed	5	18	23
Total		**48**	**134**	**182**
Table 3: Maternal Occupation and Consanguinity				

Table 3 shows correlation of maternal occupation and consanguinity revealing that out of the 48 consanguineously married cases, highest 38 cases belonged to mothers who were housewives 79.16%.

	Category of Occupation	Consanguinity		Total
		Yes	No	
Paternal occupation	Farmer (Self-employed)	21	96	117
	Employed	27	37	64
	Unemployed	0	1	1
Total		48	134	182

Table 4: Paternal Occupation and Consanguinity

Table 4 shows correlation of Paternal occupation and consanguinity revealing that out of the 48 consanguineously married cases highest 27 cases belonged to fathers who are employed 56.25% followed by 21 cases who are farmers 43.75%.

Category of Religion		Non-Consanguinity		Total
		Yes	No	
Religion	Hindu	125	40	165
	Muslim	9	8	17
Total		134	48	182

Table 5: Religion and Consanguinity

Table 5 shows correlation between religion and consanguinity, which shows that in Muslim cases (17 cases) 8 are born to consanguineously married parents which is 47.05% than Hindus in which it is 40 out of 165 cases, i.e. 24.24%. It shows that out of total 182 cases, Muslim cases are 17 cases and Hindu cases were 165.

Hence, frequency of consanguineous marriages is more in Muslims than Hindus.

DISCUSSION
Births with congenital defect are commonly found to occur among and the incidence calculated is 1.79% in the present study.

Comparison between Maternal Education and Occurrence of Consanguineous Marriages

Maternal Education in Groups Formed According to Present Study	No. of Anomalous Cases Present Study		Percentage Present Study	Acc. to Groups of Education Hussian R and Bittles.[19]	PDHS (n=5533), Hussian R and Bittles.[18] Study			NFHS (n =7965), Hussian R and Bittles.[18] Study		
	Con	N-Con			No	Unrelated	First Cousins	No	Unrelated	First Cousins
Illiterate	3	26	15.9	No education	4420	4.5	4.1	5234	4.1	4.0
Primary & secondary education	23	48	39.0	Primary	474	3.6	3.9	1214	3.6	3.7
				Secondary	584	3.2	3.1	1295	2.4	2.8
				Total	1058	6.8	7.0	2509	6.0	6.5
				Percentage	19.12%			31.5%		
SSC	6	20	14.3	Tertiary	55	2.2	2.6	222	2.2	2.2
HSC	6	13	10.4							
Graduate & above	10	27	20.3							
Total cases in present study	48	134	100.0							
	182									

Table 6

In Table 6 Hussain R and Bittles A.H.[18] in 2004 in their study from the PDHS and NFHS data showed that women married to first cousins were less likely to have undertaken post secondary education. Hence, proved that consanguinity was associated with low maternal education. This finding matches with that of present study.

In present study out of 182 cases, in 48 consanguineous cases highest number of cases belonged to mother who is primary and secondary level educated (23 cases), which is 47.9%.

Harlap S et al[17] in 2008, Hussain R et al[18] in 2004, Carnilla Stolenberg et al[19] in 1997, Khlat M, Khoury M.[20] in 1991, Emma Kerkeni, Monastiri K.[21] in 2006, Khalid Yunis MD et al[22] in 2008 stated similar finding in their respective studies, that prevalence of consanguinous marriages is more common in lower maternal educational groups.

In Table 7, Emma Kerkeni et al[21] in 2006 in their study done found that 26.5% and 24.6% of consanguineous women were having less than primary education and primary education respectively. This finding matches with that of present study.

In the present study out of 182 cases, in 48 consanguineous cases, highest number of cases belonged to mother who was primary and secondary level educated (23 cases), which are 47.9% cases.

Maternal Education Level	Present Study			Total Students Studied in Tunisia (n=1016) Emma Kerkeni et al[21] Study					
	Consanguinity			Consanguineous Men (204) 20.0%		Non-Con (812)	Consanguineous Women (204) 20.0%		Non-Con (812)
	Yes	No	Total	Cases	% Out of all Cases of that Category and Sex		Cases	% Out of all Cases of that Category and Sex	
Less than primary	3	26	29	15	20.5		48	26.5	
Completed primary school	23	48	71	30	24.4		56	24.6	
Completed secondary school				93	21.8		76	18.1	
Completed high school and above	22	60	82	66	16.8		24	12.8	
Total	48	134	182	204	100	812	204	100	812

Table 7

Education of Mother in yrs.	Total Births 100%	Offsprings in % whose Parents are Consanguineously Related			Education of Mother in Present Study	Consanguinity	
	S. Harlap.[18] Study	Any Known	Distant Relation	First Cousin		Yes	No
Unknown	2882	16.1	8.1	7.6	Illiterate	3	26
0-4	4903	18.1	8.9	8.9	Primary and secondary education	23	48
5-8	10036	11.1	6.0	4.8	SSC	6	20
9-12	8366	5.5	2.8	2.5	HSC	6	13
13 +	3628	2.6	1.7	0.9	Graduate and above	10	27
Total	29815				Total	48	134

Table 8

In Table 8, Harlap S.[17] in 2008 in his study done in 1053 major birth defects in 29,815 total births born in 1964-76. He found that among the live births born to consanguineously married parents, highest number of mothers of these offsprings were having education of less than 8 yrs. This finding matches with that of present study.

In the present study out of 182 cases, in 48 consanguineous cases highest number of cases belonged to mother who was primary and secondary level educated (23 cases), which are 47.9% cases.

Comparison between Paternal Education and Occurrence of Consanguineous Marriages
In the present study, it shows that highest no. of cases 13 cases of all 48 cases of consanguineous marriages were born to primary and secondary level educated fathers.

Carnilla Stolenberg et al[19] in Norway, Emma Kerkeni, Monastiri K.[21] in 2006, Khlat M, Khoury M.[20] in 1991, Harlap S, K. Klienhaus.[17] in 2008 in their study stated similar finding that prevalence of consanguinous marriage is more common in lower educational groups and confirmed the association of major birth defects with parental consanguinity.

In Table 9, Emma Kerkeni, Monastiri K et al[21] in 2006 in their study done in Tunisian students found that fathers with higher education level had lowest prevalence of consanguinity, but these findings were not statistically significant.

Emma Kerkeni, Monastiri K et al[21] in 2006 in their study done found 20.5%, 24.4% and 21.8% of consanguineous men were having less than primary education and primary education and secondary education respectively.

Paternal Education Level	Present Study			Total Students Studied in Tunisia (N= 1016) Emma Kerkeni et al[21] Study					
	Consanguinity			Consanguineous Men (204) 20.0%		Non-Consan (812)	Consanguineous Women (204) 20.0%		Non-Consan (812)
	Yes	No	Total	Cases	% Out of all Cases of that Category and Sex		Cases	% Out of all Cases of that Category and Sex	
Less than primary	5	16	21	15	20.5		48	26.5	
Completed primary school	13	34	47	30	24.4		56	24.6	
Completed secondary school				93	21.8		76	18.1	
Completed high school and above	40	84	114	66	16.8		24	12.8	
Total	48	134	182	204	100	812	204	100	812

Table 9

Maternal Occupation	Total Students Studied in Tunisia (n= 1016) Emma Kerkeni et al[21] Study						Occupation Present Study	Consanguinity Present Study			
	Consanguineous Men (204) 20.0%		Non-consan (812)	Consanguineous Women (204) 20.0%		Non-consan (812)		Yes	No	Total	%
	Cases	% Out of all cases of that category and sex		Cases	% Out of all cases of that category and sex						
Professional	49	16.8		30	14.0		Employed	5	18	23	12.6
Clerical	36	19.9		-	-						
Housewives	-	-		163	23.8		Housewives	38	114	152	83.5
Agriculture, laborers	119	21.9		11	8.8		Farmer (Self-employed)	5	2	7	3.8
Total	204	100	812	204	100	812	Total	48	134	182	

Table 10

Table 10 shows Emma Kerkeni, Monastiri K.[21] in 2006 in their study done in Tunisian students found that among all consanguineously married women, 23.8 % i.e. 163 cases were born to mothers who were housewives. Hence, in Tunisia for women a strong trend of increasing prevalence of consanguinity with decreasing occupational status was seen. This finding is statistically significant.

In the present study, similar findings were stated that out of the 48 consanguineously married cases, highest 38 cases belonged to mothers who were Housewives i.e. 79.16%. Also that in 152 cases, out of total 182 cases i.e. 83.5% of total cases was born to mothers who were Housewives.

Comparison of Paternal Occupation and Occurrence of Consanguineous Marriages
In the present study, comparison of paternal occupation with occurrence of consanguineous marriages and anomalies was done and found that 117 cases out of total 182 cases, i.e. 64.3% of total cases were born to fathers with Farming as occupation. But out of the 48 consanguineously married cases, highest 27 cases belonged to fathers who were employed, i.e. 56.25% followed by 21 cases who were farmers 43.75%. Hence, no significant trend was seen from the findings.

Emma Kerkeni, Monastiri K.[21] in 2006 in their study done in Tunisian students stated similar finding that for men highest occupational status/professionals showed the lowest prevalence of consanguinity. Shown in Table 11 below.

This finding was not statistically significant. But this finding does not match with that of present study.

Paternal Occupation	Total Students Studied in Tunisia (N= 1016), Emma Kerkeni et al[21] Study						Occupation Present Study	Consanguinity			
	Consanguineous Men (204) 20.0%		Non-consan (812)	Consanguineous Women (204) 20.0%		Non-consan (812)		Yes	No	Total	%
	Cases	% Out of all Cases of that Category and Sex		Cases	% Out of all Cases of that Category and Sex						
Professional	49	16.8		30	14.0		Employed	27	37	64	35.2
Clerical	36	19.9		-	-						
Housewives	-	-		163	23.8		Unemployed	0	1	1	0.5
Agriculture, laborers	119	21.9		11	8.8		Farmer	21	96	117	64.3
Total	204	100	812	204	100	812	Total	48	134	182	

Table 11

Table 11 shows Emma Kerkeni, Monastiri K.[21] in 2006 in their study found that for men, out of all 204 consanguineously married fathers, highest no. of cases, i.e. 119 cases were born to fathers with occupation of agricultural type, i.e. Farming group. But this finding was not statistically significant.

In the present study out of the 48 consanguineously married cases, highest 27 cases belonged to fathers who were employed, i.e. 56.25%, i.e. professionals and labourers combined group as in present study and not farming group. This could have occurred as in present study; in farmer group laborers were not included which were instead included in employed group. Exactly reverse was done in Emma Kerkeni et al[22] study.

Comparison of Religion and Occurrence of Consanguineous Marriages

In present study out of all 182 anomalous cases studied, 48 cases were consanguineous, i.e. 26.4%. 165 cases were Hindus and 17 cases were Muslims. Muslims had a higher frequency (47.5%) of consanguineous marriages than Hindus (24.24%). However, this difference in the frequency was not statistically significant.

A. Nath et al[23] in 2004, Harlap S et al[17] in 2008, Hussain R et al[18] in 2004, Khalid Yunis MD et al[22] in 2008 in their respective studies have stated that consanguinous marriages were more common in Muslims than Hindus. This finding matches with present study.

Asha Bai P V, John T I et al[24] in 1981 in their study stated that consanguinity is more prevalent in Hindus than Muslims. This finding differs with present study finding.

Religion A. Nath, C Patil et al[24] Study	Total Cases Studied, n= 500, 100%, A. Nath et al[23] Study				Total Anomalous Cases Studied, n= 182, 100%, in Present Study				
	Non-Consanguineous Unions= 320, 64% A. Nath, C Patil.[23] Study		Consanguineous Unions=180, 36% A. Nath, C Patil.[23] Study		Non-Consanguineous Cases n=134 % In Present Study		Consanguineous Cases, n= 48, % In Present Study		
	No. of Cases	% Out of Total Cases of same Religion	No. of Cases	% Out of Total Cases of same Religion	No.	%	No.	%	Total
Hindu	297	64.2	165	35.7	125	75.75	40	24.24	165
Muslims	23	60.5	15	39.4	9	52.94	8	47.05	17
Total	**320**	**64**	**180**	**36**	**134**	**74.6**	**48**	**26.4**	**182**
Table 12									

Table 12 shows A. Nath et al[23] in 2004 in their study done in 500 women stated that consanguinity was found in 36% of the marriages. Muslims had a higher frequency (39.4%) than Hindus (35.7%). However, this difference in the frequency was not statistically significant. The findings match with that of present study.

Religion Harlap S.[17] Study	Total Births n=29815, 100%, No. of Cases, Harlap S.[17] Study	Total Births Studied in the Study, Harlap S.[17] Study, n=29815, 100%			
		Consanguineously Married Cases, n=3011, 10.1%			Non-Consanguineous Married Cases, N=26804, 89.9%
		Any Distant Relation, %	First Cousin, %	Uncle-Niece, %	Total In %
Total	29815 cases	5.3	4.6	0.3	10.1
Muslim	310	39.4	33.9	0	73.2
Christian	50	14.0	2.0	0	16.0
Jewish	29455	4.9	4.3	0.3	9.5
Present study	Total No. of Cases n= 182	Consanguineous Cases, n= 48			Non- Consanguineous Cases, n= 134
Muslim	17	8 (47.05%)			9
Hindu	165	40 (24.24%)			125
Total	**182**	**48**			**134**
Table 13					

Harlap S, K. Klienhaus.[17] in 2008 in their study stated that muslims had a higher frequency of consanguineous marriages, i.e. 73.2% than Hindus. Also consanguinity was most prevalent in muslim community and in parents born in islamic countries. Shown in Table 13 above.

CONCLUSIONS
1. Incidence of congenital anomalies is 1.16%.
2. Consanguineous marriages and offsprings with congenital defect are found to occur more commonly to parents with primary and secondary education, i.e. Low education status.
3. Consanguineous marriages and offsprings with congenital defect are more to occur more commonly to parents of low socio-economic status, i.e. mothers who are housewives and fathers who are farmers.
4. Frequency of consanguineous marriage is found more in Muslims than Hindus.

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