

## Prevalence of Certain Common Diseases in Relation to Some Socio-Biological Risk Factors : A Preliminary Hospital Based Study in Southern Punjab, Pakistan

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**KEYWORDS** Carcinoma. Hepatitis. Goitre. Renal Failure. Ulcer. Renal Stone. Tuberculosis. Multan.

**ABSTRACT** A sample of 1553 patients of Nishtar Hospital, Multan were analysed during 1993 for prevalence of seven diseases in relation to sex; age; education; economic status; occupation; smoking; marital status; ABO and Rh blood groups; urban-rural, ethnic and geographic origins; and previous history of disease in the family. Results suggest that uterus, blood and stomach cancers are frequent; liver, cervix, colon and breast cancers are common and all other cancers are rare. Carcinoma in general is more common in females and its prevalence increases with age and decreases with education. A higher prevalence has been recorded in passive smokers, married individuals, rural masses and Baloch ethnic group. A higher prevalence of hepatitis has been recorded in classes with lower educational level; persons associated with business; individuals having AB blood group and in passive smokers. A lower prevalence has been recorded in secretarial employees and students as also in Rh-negative individuals. Goitre has a higher prevalence in females, higher age, unmarried individuals, individuals with O blood group and in Sahiwal, Liaha, Khanewal and Rajanpur districts. A higher prevalence has been suggested for individuals with A blood group and for Jhang and Rahim Yar Khan districts. Renal failures are more frequent in males, in persons associated with secretarial service and farming, and the Pathan ethnic group. Ulcers are more common in farmers and students and in persons with O blood group. The disease has a lower prevalence in house ladies, secretarial employees and businessmen, individuals with A blood group, Baloch and Pathan ethnic groups and in Rajanpur, Jhang, Liaha and Bahawalpur districts. There is a significantly higher prevalence of renal stones in secretarial employees and farmers, in persons with O blood group, married individuals and in Baloch ethnic group. It is relatively more frequent in Liaha, Bahawalpur, Rahim Yar Khan districts. The prevalence of tuberculosis increases with age, lower economic status, increased smoking, O blood group and Rh-positive individuals. Vehari, Rahim Yar Khan and Liaha are low risk tracts, while Rajanpur, Bahawalpur, Muzaffargarh and Dera Ghazi Khan are high risk tracts.

### INTRODUCTION

A complex interaction between the external

(Trotman and Solway, 1975; Negase et al., 1978) and the internal (Stine, 1989; Emery, 1986) environmental factors control the disease prevalence. The epidemiological studies on the analysis of relative importance of different possible risk factors can provide sounder basis for general health programmes and may help in an early diagnosis and thence curing of the disease (Stine, 1989). Very few epidemiological studies are available for populations of Pakistan and especially for those of southern Punjab. The present attempt tries to present a preliminary analysis on the relative influence of some risk factors on the onset of some common diseases in the patients of a large teaching hospital of southern Punjab (Pakistan).

### MATERIAL AND METHODS

All the different wards of the Nishtar Hospital, Multan were visited on different days between February and September 1993. All the patients in the wards were tried to be contacted and information on sex, age, family income, total number of dependants of the family, educational level, occupation, marital status, smoking habit, geographical and urban/rural origins, and ethnic background was collected directly from the patient and/or his/her attendants. Though a total of 1533 patients was contacted, different amount of information could be collected for different items for different patients. The hospital records were used for diagnosed disease and blood group of each patient. Though some 130 diseases/abnormalities were recorded, yet only seven "more-prevalent" ones have been subjected to detailed analysis.

The general characters of the patient population of the Nishtar Hospital have appeared in Mian and Siddique (1997). The Nishtar Hospital is a well established and large teaching hospital, deriving its patients from a wide area of the southern Punjab (Pakistan). Being a free hospital for the major part, the patient population mainly comes from poor to lower middle income classes belonging to a wide range of occupations and ethnic groups. The major part of the population around the epicentre of the hospital comprises of settlers from different parts of the subcontinent, coming in different fluxes, alongwith some original settlers of this relatively harsh desert environment with sweet ground water restricted to limited patches. Recent extension of canal network has improved active agriculture and availability of water in certain parts. There are some reports to suggest deficiency of iodine and other minerals in certain patches of the southern Punjab.

The disease prevalence has been calculated by dividing the number of the patients showing the disease by the total number of the patients falling in the respective risk class. The standard incidence ratio (SIR) has been defined as the ratio between the observed and expected number of cases, the expected being based upon the general population distribution of different classes (Pukkala et al., 1994). The association chi-square has been used for significance of the association of risk factor with disease prevalence.

## RESULTS

Table 1 presents a summary of the available data on prevalence of seven "more-common" diseases under different classes of risk factors.

### *Carcinoma*

Relative prevalence of different forms of carcinoma suggests that uterus (n=29, 13%), blood (25, 11%) and stomach (24, 11%) cancers are more frequent, though liver (18, 8%), cervix (13, 6%), colon (11, 5%) and breast (9, 4%)

cancers are also relatively common. Prostate, rectum, lung thyroid, lip and brain cancers are common, while a dozen of other types are rare or very rare in the present sample.

The table suggests significant values of association  $\chi^2$  for sex, age, occupation, smoking, marital status and rural/urban origin. The disease prevalence and SIR values indicate that females are 1.5 times more prone to develop cancer. The prevalence of cancers increases with increasing age (correlation coefficient 0.42) except for the old individuals. The SIR values suggest a higher prevalence of disease in non-working women and a lower prevalence in labourers, businessmen and students. The active smokers face a lower risk of contracting disease compared with passive smokers. Unmarried individuals are at a lower risk of cancer as compared with married ones (SIR). The rural masses appear to be at a higher risk of cancers as compared with urban population.

The association  $\chi^2$  values are not significant for education, economic status, blood groups (ABO and RH), previous history of the disease in the family and geographic origin. However, there is a general trend of decreasing prevalence of carcinoma with increasing education levels. The Balochs are at higher risk and Pathans at a lower risk as compared with Jats and Araeen ethnic groups. The records on previous history of the disease in the family indicate that a significantly lower prevalence of cancers in near relatives (SIR = 0.30). The SIR values suggest that cancers are relatively rare in Khanewal and Rajanpur districts (two widely isolated areas).

### *Hepatitis*

The values of association  $\chi^2$  suggest that disease prevalence have no significant association with any of the risk factors. SIR values also suggest no significant risk of the effect of sex, age (no hepatitis case recorded in 1-15 years age group), economic status, urban/rural origin, ethnic origin and prevalence of disease in family.

The data in hand suggest a general trend of

decreasing SIR with increasing educational levels. The incidence of the disease in the educated group is less than half as compared with illiterates or those with less than 8 years of formal education. Hepatitis appears to be more common in persons engaged in business and less frequent in those attached with secretarial services and students. The disease appears to be more frequent in passive smokers (SIR = 1.48) and rare in unmarried individuals (SIR = 0.47). There has been a higher prevalence of hepatitis in AB and a lower prevalence in Rh-negative blood groups.

#### *Goitre*

There is no significant association of any of the risk factors with development of goitre, except for previous history of disease in the family. Goitre is some 1.5 times more prevalent in females than males. None of the patients indicated the presence of disease in his/her family.

SIR values suggest that majority of the risk factors are not having a significant effect on disease prevalence. However, prevalence of goitre increases with increasing age, though it decreases in above 60 years age classes. The disease is more frequent in non working ladies, and relatively rare in individuals associated with secretarial services and business profession. Goitre appears to be more prevalent in unmarried individuals. It is more common in individuals with O and relatively uncommon in those with A blood type. The Pathan ethnic group has a higher prevalence of goitre as compared with other ethnic groups. Jhang and Rahim Yar Khan are the lower goitre risk districts while Sahiwal, Laiha, Khanewal and Rajanpur are higher risk areas.

#### *Renal Failures*

The values of association  $\chi^2$  indicate a significant association of sex, occupation and marital status. The males are at a higher risk as compared with females. The SIR values suggest that prevalence of the disease is low in non-working ladies and students, while farmers, secretari-

al workers and businessmen are at a significantly higher risk. There is a significantly lower risk of the disease in individuals that are not at the age of marriage. The prevalence of the disease is some 2.5-3.0 times higher in the Pathans, as compared with other ethnic groups.

The SIR values suggest that prevalence of the disease increases with increasing age. The disease has a slightly higher prevalence in individuals with B and a lower prevalence in AB individuals. The districts of Muzaffargarh and Bahawalpur appear as higher risk tracts, while Jhang, Sahiwal, Vehari and Rahim Yar Khan are low risk areas.

#### *Ulcers*

None of the factors has a significant association with disease prevalence at 0.05 level. The SIR values suggest a higher prevalence of ulcers in farmers and students and a lower prevalence in non-working ladies, secretarial staff and businessmen. The individuals with O blood group have a higher prevalence of the disease as compared with those with A or AB. The Baloch and the Pathan ethnic groups also appear to run a lower risk of ulcers as compared with the Jats and Araeen groups. There is a lower prevalence of the disease in Rajanpur, Jhang, Laiha and Bahawalpur districts.

#### *Renal Stone*

The development of kidney stone is not associated with any of the risk factors (non-significant association  $\chi^2$ ), except for the previous history of the disease in the family, where none of the patients indicated presence of the disease in close relatives. The SIR values also do not indicate a significant influence of sex, smoking, Rh blood group, urban/rural origin, educational level and economic status. There appears a weak trend of increasing prevalence of stone with increasing age. The SIR values suggest a significantly higher prevalence of kidney stones in secretarial staff and farmers and a lower prevalence in students. The risk of development of stone is almost half in unmarried persons as

Table 1: Prevalence (Prev., %) and standard incidence rate (SIR) of seven common diseases in southern Punjab (Pakistan) under different classes of risk factors (R.Y. Khan - Rahim Yar Khan; D.G. Khan - Dera Ghazi Khan; \* =  $\chi^2$  significant at 0.05)

Risk factor	Total		Carcinoma		Hepatitis		Gout		Renal failure		Ulcer		Renal Stone		Tuberculosis										
	No.	SIR	No.	SIR	No.	SIR	No.	SIR	No.	SIR	No.	SIR	No.	SIR	No.	SIR									
Sex																									
Male	10098	117	11.61	0.82	84	8.33	1.01	42	4.17	0.85	50	4.96	1.25	40	3.97	1.11	35	3.47	0.99	33	3.27	0.97			
Female	525	99	18.86	1.34	42	8.00	0.97	33	6.29	1.29	11	2.10	0.53	15	2.85	0.80	19	3.62	1.03	19	3.62	1.07			
$\chi^2$ Association			14.79*			0.07		3.33				8.17*			1.23		0.01					0.13			
Age (yrs)																									
1 - 15	42	3	7.14	0.50	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	2	4.76	1.32	0	0.00	0.00	0	0.00	0.00	0.00		
16 - 30	417	43	10.31	0.74	35	8.39	1.03	20	4.80	0.98	15	3.60	0.94	15	3.60	1.00	11	2.64	0.75	8	1.92	0.57	8		
31 - 45	649	104	16.02	1.14	58	5.54	1.10	34	5.24	1.07	26	4.01	1.01	23	3.54	0.99	27	4.16	1.18	29	4.47	1.32	29		
46 - 60	298	53	17.79	1.27	19	6.38	0.78	17	5.70	1.17	13	4.36	1.10	9	3.02	0.84	10	3.36	0.95	10	3.36	0.99	10		
> 60	127	12	9.45	0.67	13	10.24	1.25	4	3.15	0.64	7	5.51	1.39	6	4.72	1.32	6	4.72	1.34	5	3.94	1.16	5		
$\chi^2$ Association			14.27*			6.31		3.59				2.30			0.91		3.66					6.66		6.66	
Education (yrs)																									
None	886	136	15.36	1.10	79	8.92	1.10	44	4.97	1.03	31	3.50	0.90	34	3.84	1.07	38	4.29	1.24	37	4.18	1.19	37		
1 - 8	176	24	13.64	0.97	16	9.09	1.12	11	6.25	1.30	12	6.82	1.74	11	6.25	1.74	3	1.70	0.49	3	1.70	0.48	3		
9 - 13	304	36	11.84	0.85	23	7.57	0.86	12	3.95	0.82	12	3.94	1.01	6	1.97	0.55	7	2.30	0.67	11	3.62	1.03	11		
> 14	170	19	11.18	0.80	7	4.11	0.51	7	4.12	0.85	5	2.94	0.75	4	2.35	0.66	5	2.90	0.85	3	1.76	0.50	3		
$\chi^2$ Association			3.66			4.73		1.51				4.79			6.82		4.82					4.39		4.39	
Economic Status																									
(Rs. x 100)																									
< 21	248	41	16.53	1.17	20	8.06	0.98	17	6.85	1.42	11	4.44	1.10	12	4.84	1.38	7	2.82	0.81	14	5.56	1.59	14		
21 - 40	581	82	14.11	1.00	61	10.50	1.27	28	4.82	1.00	22	3.79	0.94	17	2.93	0.83	27	4.63	1.33	23	3.96	1.11	23		
41 - 60	353	51	14.45	1.02	24	6.80	0.83	16	4.53	0.94	16	4.53	1.13	18	5.09	1.45	13	3.68	1.06	9	2.55	0.72	9		
61 - 80	122	14	11.48	0.81	5	4.10	0.50	4	3.28	0.68	4	3.28	0.82	2	1.64	0.47	2	1.64	0.47	3	2.46	0.69	3		
81 - 100	67	8	11.94	0.84	4	5.97	0.72	2	2.99	0.62	4	5.97	1.49	1	1.49	0.43	3	4.48	1.28	1	1.49	0.42	1		
101 - 120	64	6	9.38	0.66	6	9.94	1.14	5	7.81	1.62	2	3.13	0.78	2	3.13	0.89	1	1.56	0.45	2	3.13	0.88	2		
> 120	83	13	15.66	1.11	5	6.02	0.73	1	1.20	0.25	2	2.14	0.60	3	3.61	1.03	0	0.00	0.00	2	2.40	0.68	2		
$\chi^2$ Association			3.53			8.77		2.24				1.70			6.74		7.81*					6.09		6.09	
Occupation																									
House Lady	431	86	19.95	1.45	38	8.82	1.06	30	6.96	1.45	11	2.55	0.62	12	2.78	0.77	18	4.18	1.15	18	4.18	1.22	18		
Farmer	286	44	15.38	1.12	23	8.04	0.96	10	3.50	0.73	18	6.29	1.53	15	5.24	1.45	17	5.94	1.63	14	4.89	1.43	14		
Secretarial	178	22	12.36	0.90	9	5.06	0.61	5	2.81	0.58	12	6.74	1.65	2	1.12	0.31	5	2.81	0.89	2	1.12	0.33	2		
Labourer	247	23	9.31	0.68	23	9.31	1.12	15	6.07	1.26	10	4.05	0.99	11	4.45	1.22	7	2.83	0.86	9	3.64	1.06	9		
Business	153	14	9.15	0.66	18	11.76	1.42	4	2.61	0.54	9	5.88	1.44	2	1.31	0.36	6	3.92	1.11	2	1.31	0.38	2		
Student	149	12	8.05	0.58	8	5.37	0.64	7	4.70	0.98	0	0.00	0.00	8	5.37	1.48	2	1.34	0.37	4	2.68	0.78	4		
$\chi^2$ Association			20.42*			7.22		10.14				16.59*			12.52		10.15					7.91		7.91	
Smoking																									
Active	299	33	11.04	0.77	27	9.03	1.05	12	4.01	0.80	14	4.68	1.12	8	2.68	0.74	11	3.68	1.05	15	5.02	1.47	15		
Passive	199	19	9.55	0.68	21	10.55	1.35	9	4.52	0.90	6	3.02	0.78	7	3.56	0.97	6	3.02	0.86	7	3.52	1.03	7		
Non-smoker	1022	166	16.24	1.17	83	8.12	0.94	55	5.38	1.08	39	3.82	0.98	40	3.91	1.08	36	3.52	1.01	30	2.93	0.86	30		
$\chi^2$ Association			9.39			1.33		1.02				9.93			12.52		0.17					3.03		3.03	

Table 1: Contd.....

Risk factor	Total		Carcinoma		Hepatitis		Gonorr		Renal failure		Ulcer		Renal Stone		Tuberculosis						
	No.	SIR	No.	SIR	No.	SIR	No.	SIR	No.	SIR	No.	SIR	No.	SIR	No.	SIR					
<b>Marital Status</b>																					
Indifferent	212	7.08	0.50	20	9.43	1.10	8	9.43	0.78	1	0.47	0.12	11	5.19	1.44	5	2.36	0.91	4	1.89	0.58
Unmarried	99	8.08	0.57	4	4.04	0.47	8	4.04	1.67	5	5.05	1.33	3	3.03	0.84	2	2.02	0.57	3	0.03	0.93
Married	1217	15.94	1.12	107	8.79	1.03	58	8.79	0.98	52	4.27	1.13	41	3.37	0.94	47	3.86	1.09	43	3.53	1.08
$\chi^2$ Association		14.90*			2.87			2.80			7.60*			1.82			1.91				1.56
<b>ABO Blood Gr.</b>																					
A	384	14.84	1.01	36	9.38	1.12	13	3.39	0.86	13	3.39	0.83	10	2.60	0.72	12	3.13	0.83	11	2.86	0.80
B	602	13.79	0.94	45	7.48	0.89	33	5.48	1.07	30	4.98	1.23	25	4.15	1.14	20	3.32	0.88	20	3.32	0.93
AB	156	19.18	0.83	18	11.54	1.38	9	5.77	1.12	4	2.56	0.63	3	1.92	0.53	5	3.31	0.85	5	3.20	0.90
O	316	17.41	1.19	23	7.28	0.87	20	6.33	1.23	12	3.80	0.94	15	4.75	1.31	18	5.70	1.51	16	5.06	1.42
$\chi^2$ Association		3.05			3.67			3.61			2.73			4.05			4.14				2.77
<b>Rh Blood Gr.</b>																					
Rh+	1324	14.58	0.99	116	9.40	1.04	68	5.14	1.00	53	4.00	0.99	47	3.55	0.97	50	3.78	1.02	50	3.78	1.06
Rh-	134	15.67	1.07	7	5.22	0.62	7	5.22	1.02	6	4.48	1.11	6	4.48	1.23	4	2.99	0.81	2	1.49	0.42
$\chi^2$ Association		0.11			1.97			0.00			0.07			0.30			0.24				1.85
<b>Urban/Rural Origin</b>																					
Urban	634	10.25	0.73	49	7.73	0.92	30	4.73	0.96	29	4.57	1.18	22	3.47	0.96	17	2.68	0.80	21	3.31	0.90
Rural	884	16.86	1.20	78	8.82	1.05	45	5.09	1.03	30	3.51	0.87	33	3.73	1.03	34	3.85	1.14	35	3.96	1.07
$\chi^2$ Association		13.29*			0.58			0.10			1.38			0.07			1.54				0.49
<b>Ethnic Origin</b>																					
Jat	682	14.37	1.00	53	7.79	0.92	38	5.57	1.11	23	3.37	0.87	25	3.67	1.08	20	2.93	0.81	24	3.52	0.98
Arasen	570	14.04	0.98	52	9.12	1.08	26	4.56	0.91	22	3.86	1.00	20	3.51	1.03	22	3.86	1.07	22	3.86	1.07
Baloch	133	21.80	1.52	7	7.95	0.94	2	2.27	0.46	8	9.30	2.40	3	2.26	0.67	3	3.49	0.97	3	3.49	0.97
Pathan	88	9.09	0.39	12	9.02	1.07	8	6.02	1.20	4	3.01	0.78	2	2.27	0.67	8	6.02	1.67	4	3.08	0.84
$\chi^2$ Association		11.41			2.53			1.56			7.54			1.04			3.22				0.26
<b>Previous History</b>																					
Yes	82	6.10	0.30	10	12.20	1.04	0	0.00	0.00	4	4.88	0.91	0	0.00	0.00	0	0.00	0.00	4	4.88	1.02
No	999	21.11	1.06	117	11.71	1.00	74	7.41	1.08	54	5.51	1.01	50	5.01	0.92	51	5.11	1.08	48	4.80	0.00
$\chi^2$ Association		11.22*			0.02			6.52*			0.04			4.31*			4.36*				0.00
<b>Geographic Origin</b>																					
Jhang	46	17.39	1.25	2	4.35	0.51	1	2.17	0.45	1	2.17	0.56	0	0.00	0.00	1	2.17	0.60	2	4.34	1.17
Sahiwal	120	16.67	1.20	10	8.33	0.98	8	6.67	1.38	2	1.67	0.43	4	3.33	0.93	3	2.50	0.68	3	2.50	0.67
Multan	638	16.14	1.16	44	6.90	0.81	27	4.23	0.88	29	4.55	1.18	26	4.08	1.13	19	2.98	0.82	21	3.29	0.89
Vehari	124	14.52	1.04	11	8.87	1.05	7	5.56	1.17	2	2.42	0.42	5	4.03	1.12	6	4.48	1.32	2	1.67	0.43
R.Y. Khan	62	14.51	1.04	8	12.90	1.52	2	3.23	0.54	1	1.61	0.42	3	4.84	0.74	4	6.45	1.77	1	1.61	0.43
Lahia	76	13.16	0.95	14	18.42	2.17	5	6.58	1.36	3	3.95	1.03	1	1.32	0.37	6	7.89	2.17	1	1.32	0.35
Bahawalpur	40	12.50	0.90	4	10.00	1.18	2	5.00	1.04	3	7.50	1.94	1	2.50	0.69	3	7.50	2.05	4	10.00	2.68
D.G. Khan	209	11.96	0.86	16	7.66	0.93	10	4.78	0.99	8	3.83	1.00	8	3.83	1.07	3	1.44	0.39	11	5.26	1.42
Muzaffargarh	86	11.62	0.84	7	8.14	0.96	3	3.49	0.73	6	6.98	1.81	3	3.49	0.97	6	6.98	1.91	5	5.81	1.56
Khanawal	102	3.92	0.28	11	10.78	1.27	7	6.86	1.42	3	2.94	0.76	4	3.92	1.09	5	4.90	1.34	4	3.92	1.06
Rajampur	30	3.33	0.24	3	10.00	1.18	2	6.67	1.38	1	3.33	0.87	0	0.00	0.00	0	0.00	0.00	3	10.00	2.67
$\chi^2$ Association		16.33			15.57			4.60			9.01			4.98			12.54				14.55

compared with married ones. Kidney stone also exhibits a higher prevalence in persons with O blood group and in Baloch ethnic group. The prevalence of the disease is higher in Laiha, Bahawalpur, Muzaffargarh and Rahim Yar Khan, while a low prevalence is exhibited for Jhang and Sahiwal districts.

#### **Tuberculosis**

None of the factors has a significant association with disease prevalence. The SIR values suggest that prevalence of tuberculosis slightly increases with increasing age and educational levels, and with decreasing economic status. The prevalence of the disease is lower in secretarial staff and the business class and is higher in farmers. There is a significantly higher prevalence of disease in active smokers, and a lower prevalence in individuals in pre-marital age. The prevalence of the disease is significantly higher in Rajanpur, Bahawalpur, Muzaffargarh and Dera Ghazi Khan districts and lower in Vehari, Rahim Yar Khan and Liaha. The disease exhibits a significantly higher prevalence in individuals with O blood group and a lower prevalence in Rh-negatives.

### **DISCUSSION**

The size of the sample is small, especially when it is divided into different categories, yet it provides the first detailed epidemiological analysis of a hitherto little-known population. Further studies are required to provide a sounder basis to the present findings. The present analysis suggests that different socio-biotic factors pose different degree of risk for development of different diseases.

The association analysis provides an entering wedge and directly suggests the overall significance of the risk factor in prevalence of a disease. The SIR values provide an additional tool to suggest the relative importance of individual components of the risk factor. These are of a special significance where the risk factor does not indicate a strong association.

#### **Carcinoma**

Cancer is a group of over 100 pathological/epidemiological symptoms (Ackerman and Regato, 1970) and is controlled by a combination of genetic resistance, host mechanisms and environment, though environmental factors and life style have a greater role (Doll and Peto, 1981; Higginson et al., 1990; Pervez, 1992). Different target organs/tissues have been reported to be affected by different risk factors to a different degree: hepatocellular associated with drinking, hepatic virus (Brotodihardjo et al., 1994), males over 40 years and with Africa, China and Asia (Rustgi, 1987); anal tumour with smoking and homosexual sexual intercourse (Deans et al., 1994); prostate and lung with smoking (van der Gulden et al., 1994; Coggon and Inskip, 1994); cervical with number of sexual partners, early age of first intercourse and oral contraceptives (Eluf-Neto et al., 1994); gastrointestinal with dietary habits, smoking and alcohol (Wynder and Gon, 1977; Waterhouse et al., 1982); and breast with age at marriage (Farewell, 1977; Brinton et al., 1982); etc. The present analysis deals with the effect of different socio-biological factors on development of general carcinoma in all the different organs.

Our results suggest that females run a higher risk of contracting carcinoma, which can be ascribed to the fact that the female primary/secondary sex organs, like uterus, cervix, breast and ovary, are well known target organs to develop carcinoma. This has also been reflected in our data and has been reported previously (Rennert, 1991; Rathor et al., 1991). This is despite the fact that carcinoma of prostate and testis are present in males only (Al-Mofarreh et al., 1991; Waterhouse et al., 1982; Silverberg, 1986; Qureshi et al., 1990).

The increasing incidence of carcinoma with age can be explained on the cumulative effect of carcinogens. Previous studies have suggested a higher prevalence of carcinoma in old age group, *i.e.*, 35-55 (Waterhouse et al., 1982; Silverberg, 1986; Al-Mofarreh et al., 1991;

Rathor et al., 1991). A decrease in the prevalence of carcinoma with increasing educational level can be ascribed to higher awareness. A higher prevalence of cancers in non-working women and a lower prevalence in the students appears to be an artefact introduced by sex and age. A lower prevalence of cancers in labourers and business class is hard to be explained.

Smoking is widely reported as risk factor for many types of cancers, including lung, blood, gastrointestinal tract, skin, etc. However, our results suggest a higher prevalence of cancers in passive smokers as compared with active ones, which should be a point of alarm for many who are living in the environment with smoking hazard. Similarly, our results suggest a higher prevalence of carcinoma in rural masses, which can be probably associated with wide spread use of insecticides, without adopting protective guards.

The present study suggests that the Balochs run a higher risk of contracting cancers, while Pathans are at a lower risk. No previous study is available from the area on ethnic variations in development of cancer, yet gastrointestinal tract cancers has been reported to be more frequent in northern parts of Pakistan (Ahmed et al., 1992) though it does not directly suggest a higher prevalence in Pathans. Prostate cancer has been previously reported to be more common in Whites as compared with Blacks (Targonski et al., 1991).

### *Hepatitis*

Hepatic cirrhosis is becoming more common all over the world (Rains and Mann, 1988) and this appears to be equally true for Pakistan/southern Punjab. The present results largely go against Edwards and Bouchier (1991) in suggesting that the disease is more common in younger than in older ages (no hepatitis case in <15 years of age), in middle or upper income groups and in smokers. The present results, however, support their observation in that the disease has equal incidence in both the sexes.

No previous study has indicated the effect of

educational level, smoking, occupation, marital status and blood groups on the prevalence of hepatitis. An inverse relationship of the prevalence of disease with increasing educational level could be explained on increasing public health awareness.

### *Goitre*

Goitre is a world-wide problem and is associated with dietary iodine deficiency and faecal contamination of drinking water (Taylor, 1979). Northern mountain areas of Pakistan, especially Chitral (Mulk and Shahid, 1974), are believed to be highly endemic areas for the prevalence of goitre. The present is the first report to suggest a slightly higher prevalence of goitre in Sahiwal, Liaha, Khanewal and Rajanpur districts and a lower prevalence in Jhang and Rahim Yar Khan. No previous report suggests a lower prevalence of goitre in the Pathans.

A higher prevalence of goitre in females, as suggested by the present study, has been previously reported for the population of Guinea-Bissau (Follis, 1964; Oliveira et al., 1991). However, our results are not in confirmation with the reports from Guinea-Bissau in suggesting that the goitre is more common in pre-adult ages. The present results suggest that prevalence of disease increases with increasing age. A higher prevalence of the disease in non-working ladies substitutes a higher incidence of the disease in females. No previous report suggests a higher prevalence of the disease in unmarried persons and in O blood type and a lower prevalence in A.

### *Renal Failure*

Renal failure is an outcome of any condition that destroys normal structure and function of kidneys and can be attributed to a complex interaction of risk factors (Rains and Mann, 1988; Edwards and Bouchier, 1991). The present results suggest that blood groups, urban/rural origin and history of the disease in the family have no direct effect on its prevalence. Though smok-

ing, under the present study, is not a significant risk factor, yet it has been reported as a high risk factor (Edwards and Bouchier, 1991). On the other hand, the present study suggests sex (males at a higher risk), age (prevalence increases with increasing age), occupation (non-working ladies at a lower risk, a possible artefact of females being at lower risk; farmers, secretarial workers and business class at a higher risk, probably associated with job tension), marital status (persons not at marriage age at lower risk, a possible artefact of age), ethnic group (Pathans at 2.5-3.0 times higher risk) and geographical area (higher prevalence in Muzaffargarh and Bahawalpur; lower prevalence for Jhang, Sahiwal, Vehari and Rahim Yar Khan districts) as important risk factors though there is no mention of these in the available literature. Educational level and economic status are not working as risk factors indicating that public health awareness is not playing a significant role in development of renal failures.

#### *Ulcers*

Ulcer is discontinuity of epithelial surface and mostly concerns gastrointestinal tract. Our results suggest that sex, smoking, urban/rural origin and economic status are not working as risk factors. Some previous studies have suggested that sex (Johnsen et al., 1994), smoking (Johnsen et al., 1994; Chandrakumaran et al., 1994) and social status (higher income classes at higher risk, Edwards and Bouchier, 1991) are significant risk factors in development of ulcers.

The present study suggests that the prevalence of ulcer decreases with age (as indicated by a higher prevalence in students and in pre-marital ages) which is against the studies conducted in Norway, where ulcers increase with age (Johnsen et al., 1994). Increasing educational levels and thence public health awareness decreases prevalence of ulcers is in line with report of Johnsen et al. (1994). Our results are also in line with those of Roberts (1957) in suggesting that ulcers are more frequent in O blood types. Our data for the first time suggest a high-

er prevalence of disease in farmers and lower prevalence in secretarial workers and business class; Baloch and Pathans facing a lower risk and lower prevalence of disease in Rajanpur, Jhang, Liaha and Bahawalpur districts.

#### *Renal Stones*

Very little is available on risk factors causing renal stones. It is believed to be more common in males between 20 and 50 years of age (Rains and Mann, 1988). The present study, however, suggests that sex, smoking, Rh blood groups, rural/urban origin, education level and economic status are not working as significant risk factors. Age appears to slightly increase the risk (student are also at lower risk). The renal stone is more frequent in secretarial worker and farmer, in married persons, O blood type and in the Baloch ethnic group, for which no explanation is available. Similarly a higher prevalence of the disease in Liaha, Bahawalpur, Muzaffargarh and Rahim Yar Khan and lower prevalence in Jhang and Sahiwal administrative districts are not explainable with the information in hand.

#### *Tuberculosis*

Tuberculosis continues to be a major public health problem in poor countries (Toman, 1982) and socio-economic factors account for 60-70% of its prevalence, while quality of health services account for 10-20% and climatic factors for the remaining 10-30% (Styblo and Sutherland, 1982; Zaluaga et al., 1992). Our results largely go in line with the previous findings in suggesting that whereas sex, urban/rural origin, ethnic groups, Rh blood group and educational levels have little effect on the disease prevalence, economic status (also explains low prevalence in secretarial workers and business class as compared with farmers) inversely affects the prevalence of tuberculosis. The increase in the prevalence of the disease with age (upto 45 years) can be explained in terms of decreasing immunity/body defence and increasing tensions with age. This has also appeared as an artefact to suggest a lower preva-

lence of tuberculosis in the premarital age. An increasing prevalence of disease with degree of smoking has been suggested previously. The present result suggest a non-significant but higher prevalence of the disease in O blood types. This partially goes in favour of previous reports that blood group has no association with the prevalence of tuberculosis (Campbell, 1956; Lewis and Woods, 1961; Abbas, 1985) and goes against the reports suggesting a higher prevalence of the disease in B blood group (Oik et al., 1962; Jain, 1970; Viskum, 1973; Overfield and Klauber, 1980). The lower prevalence of the disease in Vehari, Rahim Yar Khan and Laha and a higher prevalence in Rajanpur, Bahawalpur, Muzaffargarh and Dera Ghazi Khan can also be explained in terms of comparatively better economic levels of the populace of the former districts.

#### General Epidemiology

Different risk factors, under the present study appear to have different influence on epidemiology of different diseases. Educational levels and economic status consistently decrease the prevalence of almost all the diseases, except ulcers that increases with economic status. Aging, in general, increases the prevalence of different diseases, especially that of carcinoma, renal failures, renal stones and tuberculosis, but the prevalence of ulcers decreases with age. Urban/rural origin does not significantly effect on disease prevalence, except for a higher prevalence of carcinoma in patients with rural origin. Carcinoma and goitre are more frequent in females, while renal failures in males. The prevalence of different diseases in different occupations, marital status and geographic origins is controlled by a complex interaction of sex, age, economic status and educational levels. Smoking appears to directly increase the prevalence of tuberculosis, while passive smokers are at a higher risk of contracting carcinoma and hepatitis and at a lower risk of developing ulcers.

Ethnic origin has no effect on prevalence of infectious diseases. Different ethnic groups are

at different degree of risk for developing non-infectious diseases, probably under their genetic armoury. In Balochs, carcinoma and renal failures are more common, while goitre and ulcers are rare. Pathans are more prone to contract goitre and renal stones, while they rarely contract carcinoma and ulcers. Rh-negatives are at lower risk of being infected with infectious hepatitis and tuberculosis. The individuals with O blood group are at a higher risk of developing tuberculosis, ulcers, renal stones and at a lower risk for renal failures. AB individuals bear a higher prevalence of hepatitis, and a lower prevalence of ulcers and renal failures.

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