

Relation between Socioeconomic Status of Parents and Health of Children

Mohd. Zulkifle¹, Abdul Haseeb Ansari², Manchala Ramesh³

^{1,2,3} Department of Tahaffuzi wa Samaji Tib, National Institute of Unani Medicine, Kottigepalya, Bangalore, Karnataka, India

Correspondence should be addressed to Abdul Haseeb Ansari, ahansari_001@rediffmail.com

Publication Date: 21 November 2012

Article Link: <http://medical.cloud-journals.com/index.php/IJAAYUSH/article/view/Med-07>



Copyright © 2012 Mohd. Zulkifle, Abdul Haseeb Ansari and Manchala Ramesh. This is an open access article distributed under the **Creative Commons Attribution License**, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Abstract The wealth of country in terms of man power totally depends upon the children, the future citizen. Apart from this, children also determine the socio-cultural values of the future. Physical, mental and social well beings of the children are closely related to the socioeconomic well beings of the parents. To know the Relationship between socioeconomic status of parents and health of children of Government primary school of Bangalore, a one-time observational cross sectional study was conducted in the three primary schools of Kottigepalya. 456 children were included in the study. A complete physical examination of the children was done and deviations from normal were recorded. A large number, 319 (69.96%), school children were found to be sick, in which 39 (12.23%) children were belonging to SES lower middle (III), 239 (74.92%) were to SES upper lower (IV) and 41 (12.85%) children were to SES lower (V). This results show that the SES of parents is truly affects the health of children.

Keywords *School Children, School Health Services, Health Appraisal, Socioeconomic Status*

1. Introduction

The wealth of country in terms of man power totally depends upon the children, the future citizen. Apart from this, children also determine the socio-cultural values of the future. Physical, mental and social well beings of the children are closely related to the socioeconomic well beings of the parents. Nurturing the children in affectionate minimum need fulfilling environment is mandatory for their proper growth and development. The child can be grown in a responsible citizen only when he is nurtured well without any stress. Any type of stress interferes with the physical, mental and social development of the children. Achievements in the field of sports and in the field of academy all are somehow concern with stress free environment in which the children are nurtured and trained. Mere reparation of one parent can have so adverse effect on coming days of a child that he/she may pervert towards delinquency. Keeping in view the above fact a study was conducted to observe the relationship between socioeconomic status (SES) of parents and health status of their children. This study was conducted in three Government primary school of Kottigepalya area of Bangalore.

2. Materials and Methods

There are three Government primary schools in the under study area. Prior permission from school administration was taken to conduct the in their schools and the ethical clearance was obtained from Institutional Ethical Committee (IEC). All children from 1st to 5th standard were included in the present study. The schools were visited twice a week, for the collection of data a readymade proforma, consisting of relevant information, was filled by interviewing the parents' of the children. The children were instructed to call their parents for interview day before schedule visit. Every child was examined physically with the help of class teacher. The total 456 children of both sexes and of 5+ to 11+ years age group were found and included in the present study. The children were classified from 5-11 years age group according to ICMR classification [1]. The parents' occupation and education were recorded to calculate the SES as per Kuppuswamy's SES Scale by applying the conversion factor for current year i.e. 2007 [2]. Family type was also recorded.

3. Observations and Results

Table 1: Relationship between socioeconomic status (SES) and health of school children

SES	Normal		Sick		Total (n=456)	
	No. of children	Percentage (%)	No. of children	Percentage (%)	No. of children	Percentage (%)
Lower Middle (III)	26	40.00	39	60.00	65	14.25
Upper Lower (IV)	104	30.32	239	69.68	343	75.22
Lower (V)	7	14.58	41	85.42	48	10.53
Total	137	30.04	319	69.96	456	100.00

$$\chi^2=8.537; df=2; P<0.05$$

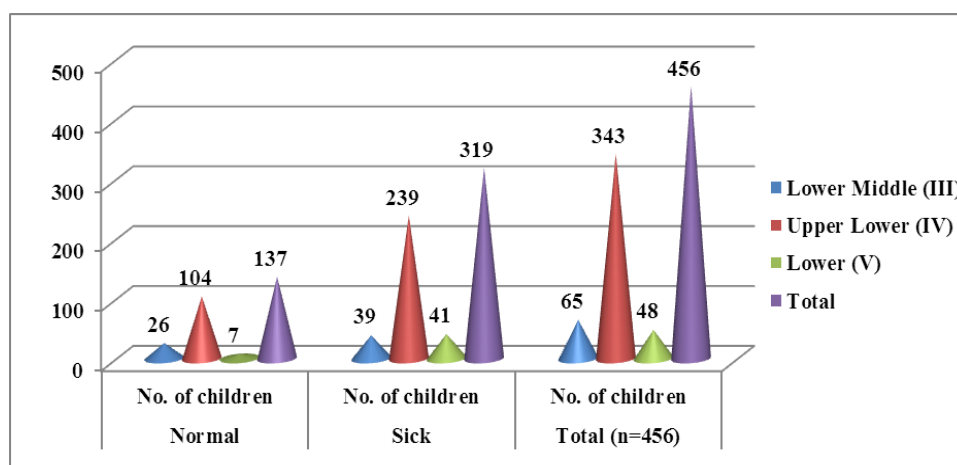


Figure 1: Relationship between socioeconomic status (SES) and health of school children

Table 2: Relation between family type and health of school children

Family type	Normal		Sick		Total (n=456)	
	No. of children	Percentage (%)	No. of children	Percentage (%)	No. of children	Percentage (%)
Nuclear	76	28.79	188	71.21	264	57.89
Joint	37	36.63	64	63.37	101	22.15
Three generation	22	29.33	53	70.67	75	16.45
Broken	2	12.50	14	87.50	16	3.51
Total	137	30.04	319	69.96	456	100.00

$\chi^2=4.646$; $df=3$; $P>0.05$

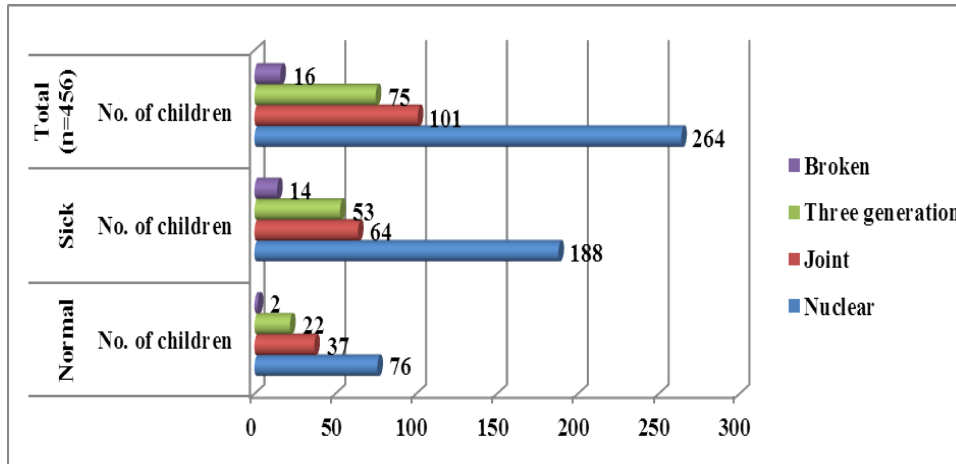


Figure 2: Relation between family type and health of school children

Table 3: Relation between mother educational status and health of school children

Mother Education Status	Normal		Sick		Total (n=456)	
	No. of children	Percentage (%)	No. of children	Percentage (%)	No. of children	Percentage (%)
Illiterate	88	28.12	225	71.88	313	68.64
Literate	49	34.27	94	65.73	143	31.36
Total	137	30.04	319	69.96	456	100.00

$\chi^2=1.767$; $df=1$; $P>0.05$

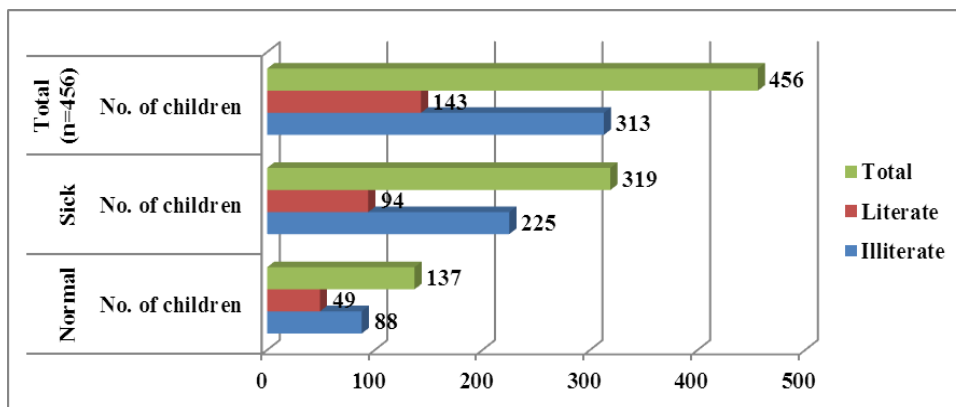


Figure 3: Relation between mother educational status and health of school children

Table 4: Relation between father educational status and health of school children

Father Education Status	Normal		Sick		Total (n=456)	
	No. of children	Percentage (%)	No. of children	Percentage (%)	No. of children	Percentage (%)
Illiterate	88	29.83	207	70.17	295	64.69
Literate	49	30.43	112	69.57	161	35.31
Total	137	30.04	319	69.96	456	100.00

$\chi^2=0.0181$; $df=1$; $P>0.05$

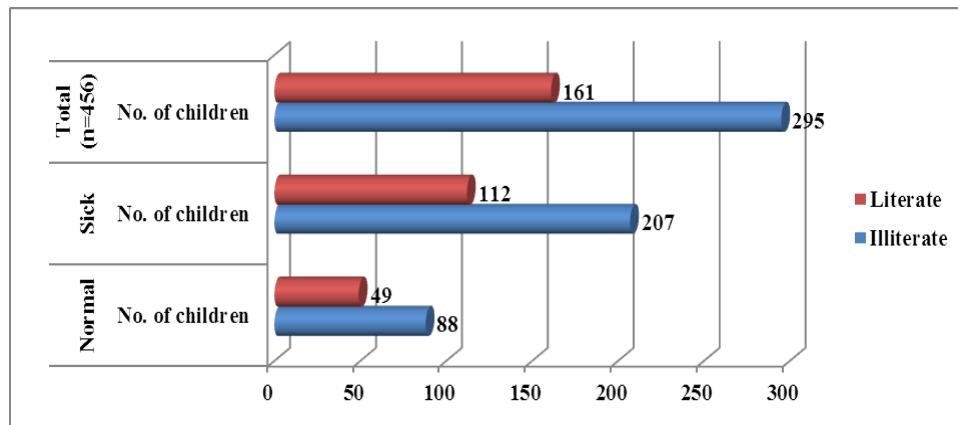


Figure 4: Relation between father educational status and health of school children

Table 5: Nutritional grading of school children according to sex

Nutritional Grade	Boys (n=246)		Girls (n=210)		Total (n=456)	
	No. of children	Percentage (%)	No. of children	Percentage (%)	No. of children	Percentage (%)
Normal	206	83.74	157	74.76	363	79.60
Grade I Malnutrition	33	13.41	43	20.48	76	16.67
Grade II Malnutrition	6	2.44	9	4.28	15	3.29
Grade III Malnutrition	1	0.41	1	0.48	2	0.44
Total	246	100.00	210	100.00	456	100.00
Total (n=456)	246	53.95	210	46.05	456	100.00

$\chi^2=5.624$; $df=1$; $P<0.05$

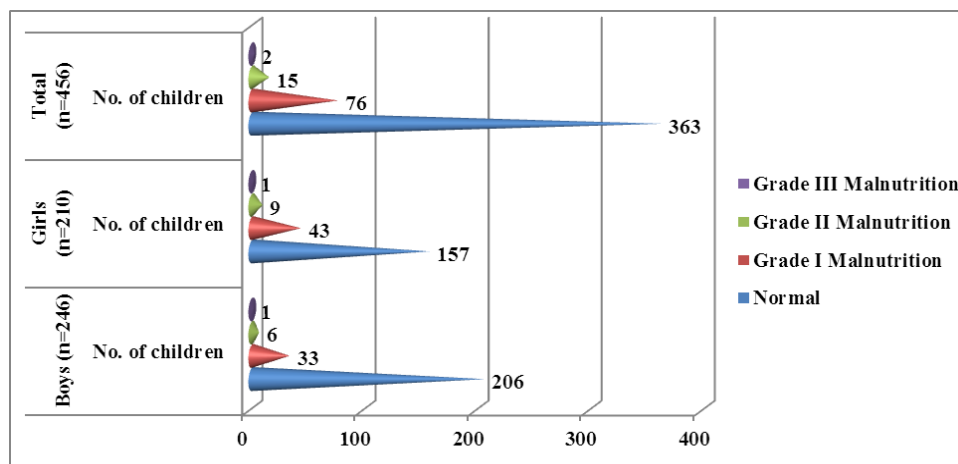


Figure 5: Nutritional grading of school children according to sex

Table 6: Sickness status in school children according to sex

Sickness status	Boys (n=246)		Girls (n=210)		Total (n=456)	
	No. of children	Percentage (%)	No. of children	Percentage (%)	No. of children	Percentage (%)
Dental Caries	68	27.64	56	26.66	124	27.19
Scabies	5	02.03	1	00.48	6	01.32
Pediculosis	32	13.01	64	30.48	96	21.05
Other Than or Normal	141	57.32	89	42.38	230	50.44
Total	246	100.00	210	100.00	456	100.00
Total (n=456)	246	53.95	210	46.05	456	100.00

Pediculosis: $\chi^2=20.799$; df=1; P<0.05

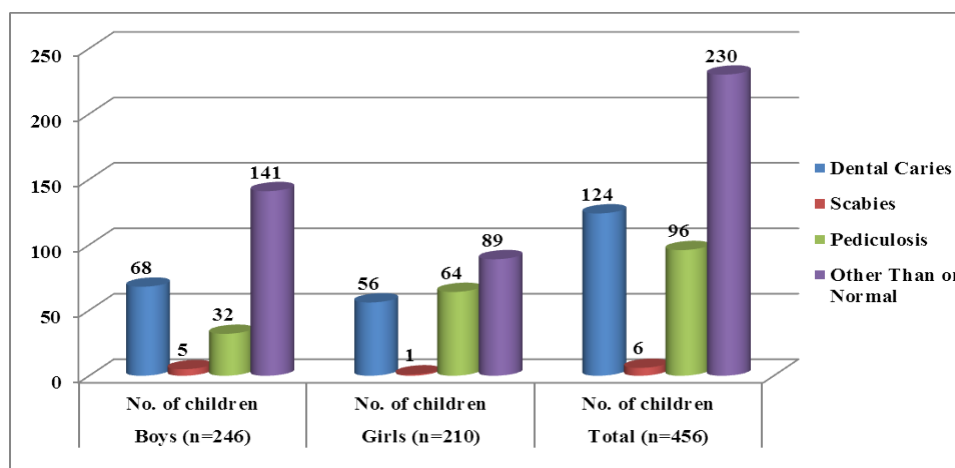


Figure 6: Sickness status in school children according to sex

4. Discussion

As shown in Table 1 & Figure 1, out of total 456 children in the present study 65 (14.25%) children were belonging to SES lower middle (III), 343 (75.22%) were to SES upper lower (IV) and 48 (10.53%) children were to SES lower (V). Of the children from SES lower middle (III), 40% (26) children were found normal and 60% (39) children were found sick. Of the children from SES upper lower (IV), 30.32% (104) were found normal and 69.68% (239) were found sick. Similarly the children from SES lower (V), 14.58% (7) were found normal and 85.42% (41) were found sick. Statistically association between SES of parents and health of the school children was found significant ($\chi^2=8.537$; df=2; P<0.05). The prevalence of sickness was more (85.42%) in children of lower SES parents as compare to other SES parents' children. No contemporary study was available for comparison.

Out of 456 studied children, 264 (57.89%) were from nuclear, 101 (22.15%) were from joint, 75 (16.45%) were from three generation and 16 (3.51%) were from broken family. Among the children from nuclear family, 28.79% (76) were found normal and 71.21% (188) were found sick. Among the children from joint family, 36.63% (37) were found normal and 63.37% (64) were found sick. The health status of the children from three generation family was as 29.33% (22) normal and 70.67% (53) sick. Among the children from broken family, 12.50% (2) were found normal and 87.50% (14) were found sick. The prevalence of sickness was found highest (87.50%) in the children of broken family, as shown in Table 2 & Figure 2. Statistically the observed difference was not found significant ($\chi^2=4.646$; df=3; P>0.05). The prevalence of sickness was equally distributed in all types of families. The statistical connotation clarified that the children are taken care equally in all the families, but this statistical connotation is not practical. Both nurturing and care are affected by the family type.

Mother education is very crucial in child care. In the present study 313 children had illiterate mothers and 143 children had literate mothers. Among the children who had illiterate mothers, 28.12% (88) were found normal and 71.88% (225) were found sick. Among the children who had literate mothers 34.27% (49) were found normal and 65.73% (94) were found sick, as shown in Table 3 & Figure 3. Once more, the difference in health status of children of illiterate and literate mothers was insignificant statistically ($\chi^2=1.767$; $df=1$; $P>0.05$).

In the present study 295 children had illiterate fathers and 161 children had literate fathers. Among the children who had illiterate fathers, 29.83% (88) were found normal and 70.17% (207) were found sick. Among the children who had literate fathers, 30.43% (49) were found normal and 69.57% (112) were found sick, as shown in Table 4 & Figure 4. Statistically the association between fathers' educational status and health status of their children was not found significant ($\chi^2=0.0181$; $df=1$; $P>0.05$). The normal and sick children were equally distributed in families with literate and illiterate fathers. It was the first study of its own kind, in which association between various socioeconomic factors of parents and health status of their children was studied. So we could not find any contemporary study for comparison.

The prevalence of malnutrition in under study population of the school children was found to be 20.40% (93). In boys it was 16.26% (40) and in girls it was 25.24% (53), as shown in Table 5 & Figure 5. Statistically this difference was found significant ($\chi^2=5.624$; $df=1$; $P<0.05$). This may be due preferential food to boys. Goyal RC et al from school children of Ahmednagar city reported the prevalence of malnutrition as 26.8% [3]. Indira Bai K et al from school children of Tirupathi city reported the prevalence of malnutrition as 47% [4]. Dhingra DC et al from school children of Delhi reported the prevalence of malnutrition as 50% [5]. Panda P et al from school children of Ludhiana city reported the prevalence of malnutrition as 52.2% [6]. Sundaram MV et al from school children of Madras city reported the prevalence of malnutrition as 79% [7]. In the present study the observed prevalence of malnutrition was lower than the reference studies. This may be due the good and better awareness of dietary intake in parents of children of present study.

As shown in Table 6 & Figure 6, the prevalence of dental caries in the school children of present study was found to be 27.19% (124). This observed prevalence is lower than the reported prevalence of dental caries by Gill PS et al from Lucknow [8], Sundaram MV et al from Madras city [7] and Koshi ET et al from Lucknow [9] as 48.8%, 38.6% and 34.1% respectively. The lower prevalence may be due to better oral hygiene in the children of the present study. The prevalence of the present study is higher than reported prevalence by Panda P et al (1997), [10] Panda P et al (2000) [6] from Ludhiana city, Rao SP et al from urban Wardha, [11] Gupta RK et al from Jammu [12] and Bhagwat S et al from Talegaon town [13] as 11.1%, 23.1%, 22.8%, 16.84% and 23.20% respectively. This difference may be because of better SES of the parents' of the children of the reference studies.

Barometer of personal hygiene status is scabies. As shown in Table 6 & Figure 6, in the present study prevalence of this contagious disease in school children was found to be 1.32% (6). In boys it was 2.03% (5) and in girls it was 0.48% (1). Koshi ET et al from the school children of Lucknow reported the prevalence of scabies as 6.5% [9]. The observed difference may be due to better personal hygiene and better skin care of the school children of the present study.

Pediculosis is another indicator of personal hygiene status, it was found prevalent in 21.05% (96) school children in present study. In boys the prevalence was 13.01% (32) and in girls it was 30.48% (64), as shown in Table 6 & Figure 6. The difference was found significant by $\chi^2=20.799$; $P<0.05$. Because of long hair and negligence towards proper hair care, the prevalence of pediculosis capitis (involving hair on head region) is higher in girls and the same was observed in present study. Koshi ET et al reported the prevalence of pediculosis as 31.1% from school children of Lucknow [9]. Sundaram MV et al reported the prevalence of pediculosis as 17.6% from school children of Madras

city [7]. The higher and lower prevalence of pediculosis in reference studies may be attributed to the level of personal hygiene status and knowledge about hair care in under study children population.

5. Conclusion

From the present study it can be concluded that better care and nurturing of children are mandatory for better health. It was observed in the studied children that care and nurturing deprived children showed higher prevalence of sickness. The higher prevalence of diseases was observed in children from low socioeconomic status, broken family and illiterate parents. Preferential food to boy is probably the reason for higher prevalence of malnutrition among girl students. Personal hygiene related diseases i.e. scabies and pediculosis were more prevalent in girl students, probably because of less attention towards personal hygiene and habit of close contacts.

References

- [1] Anonymous. ICMR. Growth and physical development of Indian infants and children. Technical Report Series, No. 18. New Delhi. ICMR Publishers.1989; 58-59.
- [2] Kumar N., et al. *Kuppuswamy's Socioeconomic Status Scale-Updating for 2007*. Indian Journal of Pediatrics. 2007. 74; 1131-1132.
- [3] Goyal R.C., et al. *Health status of school children in Ahmednagar city*. Indian Journal of Maternal and Child Health. 1993. 4; 81-83.
- [4] Indira Bai K., et al. School health service programmes. *A comprehensive study of school children of Tirupathi city, A.P.* Indian Pediatrics. 1976. 13; 751-758.
- [5] Dhingra D.C., et al. *Health status of school children of various socioeconomic groups*. Indian Pediatrics. 1977. 14; 243-267.
- [6] Panda P., et al. *Health status of school children in Ludhiana city*. Indian Journal of Community Medicine. 2000. 25; 10-17.
- [7] Sundaram M.V., et al. *Health profile of school children in Madras city*. Indian Pediatrics. 1978. 15; 725-730.
- [8] Gill P.S., et al. *Health status of primary school children in Lucknow*. Antiseptic. 1969. 4; 1-2.
- [9] Koshi E.T., et al. *A study on health of primary urban school children*. Indian Journal of Medical Research. 1970. 58; 1742-1752.
- [10] Panda P., et al. *Growth and Morbidity among rural school children in Ludhiana, Punjab, Health and Population*. Perspectives and Issues. 1997. 20; 20-28.
- [11] Rao S.P., et al. *Dental caries and periodontal diseases among urban, rural, tribal school children*. Indian Pediatrics. 1993. 30; 759-764.
- [12] Gupta R.K., et al. *Health status of primary school children in Jammu*. Indian Journal of Preventive and Social Medicine. 1997. 28; 90-94.
- [13] Bhagwat S., et al. *Some neglected aspects of school health checkups*. Indian Journal of Community medicine. 2004. 29; 29-33.

Hypertension Scenario in Bangalore Metropolitan Transport Corporation (BMTc) Employees – A Study

Mohd. Zulkifle¹, Abdul Haseeb Ansari², Mohd. Shakir³, Mohd. Akmal³

^{1,2,3} Department of Tahaffuzi wa Samaji Tib, National Institute of Unani Medicine, Kottigepalya, Bangalore, Karnataka, India

Correspondence should be addressed to Abdul Haseeb Ansari, ahansari_001@rediffmail.com

Publication Date: 21 November 2012

Article Link: <http://medical.cloud-journals.com/index.php/IJAAYUSH/article/view/Med-14>



Copyright © 2012 Mohd. Zulkifle, Abdul Haseeb Ansari, Mohd. Shakir and Mohd. Akmal. This is an open access article distributed under the **Creative Commons Attribution License**, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Abstract Hypertension is a major public health problem in developed as well as in developing countries. Most of the time it is diagnosed when the organ system has been damaged, hence it is known as silent killer. Another factor regarding hypertension is that once the person develops hypertension it persists throughout life because its etio-pathogenesis is yet unknown. Hypertension is a major factor for cardiovascular mortality and it ranks fourth worldwide. Its prevalence is escalating in different geographical locations of the world, especially in India due to unfavorable modifications of the lifestyle and dietary habits. The only way to control and to prevent hypertension is to educate the people about risk factors and preventive strategies. The present study was planned with an objective to know the prevalence of hypertension in BMTc employees. The study was cross sectional field based survey conducted in BMTc employees of Summanhalli Depot, Bangalore. Three readings of blood pressure were recorded, of either sex, between the age of 30-50, and their average was calculated. The duration of study was 6 months. The sample size was 535. The study revealed 14.02% prevalence of HTN in studied sample. Mild, moderate and severe grade of hypertension were found in 58.67%, 17.33% and 5.66% volunteers respectively. In the present study 8% and 30.67% volunteers were of ISH and IDH respectively. The prevalence was significantly higher in the aged volunteers.

Keywords *Hypertension, Prevalence, Unani Medicine, Risk Factors*

1. Introduction

High blood pressure is an important public health problem in India. Recent studies have shown a high prevalence of hypertension among adults in both urban and rural areas [1]. Well-coordinated national surveys are not reported from subcontinents of India but several small regional surveys have reported in last two decades [2]. Hypertension is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease deaths in India [3, 4]. It is also a leading cause of renal insufficiency and peripheral vascular diseases [5]. Hypertension is poorly controlled worldwide with less than 25% controlled in developed countries and less than 10% controlled in developing countries [6].

The causal relationship of hypertension is yet to be established and also there is no clear-cut defined pathogenesis, because of this, incidence of hypertension is increasing day by day. Awareness and treatment of hypertension varies considerably between countries and regions. In developed countries, there are approximately one half to two thirds of hypertensive in general population aware of their diagnosis and one third to one half receiving treatment. The level of awareness and treatment is much lower in the developing countries than the developed one [6].

Field based studies on prevalence of hypertension are still scarce and more field based studies/surveys are required to highlight the problem precisely. In fact prevalence of hypertension is increasing constantly due to the industrialization, urbanization and change lifestyle [3]. Keeping the above potential of hypertension, the present study was conducted in high risk population i.e. BMTC (Bangalore Metropolitan Transport Corporation), Bangalore. They are more prone to expose to risk factors like cigarette smoking, alcohol intake, irregular dietary habits and stress etc., hence the present study was designed to find out the prevalence of hypertension in under study population and to impart the knowledge about the prevention of hypertension at individual and mass levels, for this purpose oral presentations were organized during study period.

Although the successful control of hypertension is achieved by medication, this is known as secondary prevention, but the ultimate goal in general is primary prevention [7].

2. Methodology

The study was conducted in BMTC Depot No. 31 (Summanhalli Depot), after obtaining permission from Managing Director of BMTC, Bangalore. The present study was a cross sectional study and the duration was 6 months. The sample size was calculated as 535 as per formula " $N=4pq/L^2$ " (p =present prevalence, $q=100-p$, $L=15\%$ of p), used for the calculation of sample size determination in the health studies [8, 9] taking the prevalence rate as 25% and permissible error level as 15%. For the assessment, during study, the physical instruments of high quality were used like stethoscope and mercury sphygmomanometer. A schedule which was based on the demographic profile and risk factors of hypertension was administered to collect the relevant data.

Measurement of blood pressure (BP) was recorded by auscultatory method. Systolic blood pressure was marked the point at which Korotkoff sound appears and the point at which the sound disappears was taken as diastolic blood pressure. As per WHO criteria, the subjects were categorized into mild, moderate and severe form; in addition to this third category of subjects was made who were on Anti-Hypertensive Drug (AHD) [10].

The collected data and results were evaluated and presented in the form of tables and figures in accordance to the purpose of the study. It was a prevalence study and direct comparison with the previous studies was made.

3. Observations and Results

Table 1: Distribution of Subjects according to Hypertension Status (n=535)

Hypertension Status	No. of Subjects	Percentage (%)
Normal	460	85.98
Hypertensive	75	14.02
Total	535	100

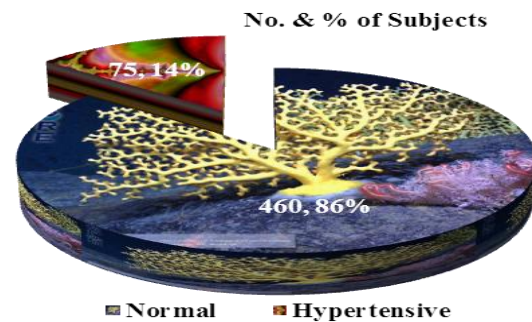


Figure 1: Distribution of Subjects according to Hypertension Status (n=535)

Table 2: Distribution of Hypertensive Subjects according to Grade of Hypertension (n=75)

Grade of Hypertension	No. of Subjects	Percentage (%)
Mild	44	58.67
Moderate	13	17.33
Severe	4	5.66
On Anti - Hypertensive Drug	14	18.67
Total	75	100

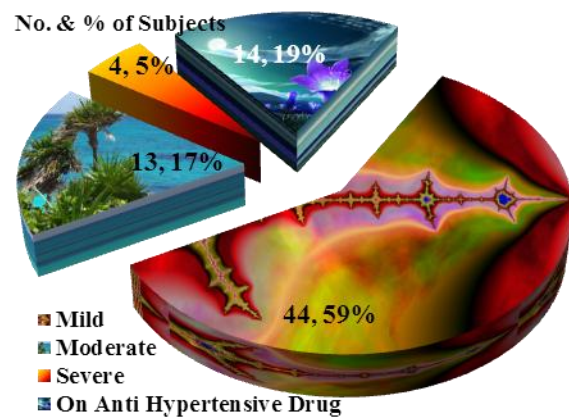


Figure 2: Distribution of Hypertensive Subjects according to Grade of Hypertension (n=75)

Table 3: Distribution of Hypertensive Subjects according to Characteristics of BP Reading (n=75)

Characteristics of BP Reading	No. of Subjects	Percentage (%)
Isolated Systolic Hypertensive	06	8.00
Isolated Diastolic Hypertensive	23	30.67
Hypertensive (Both)	46	61.33
Total	75	100

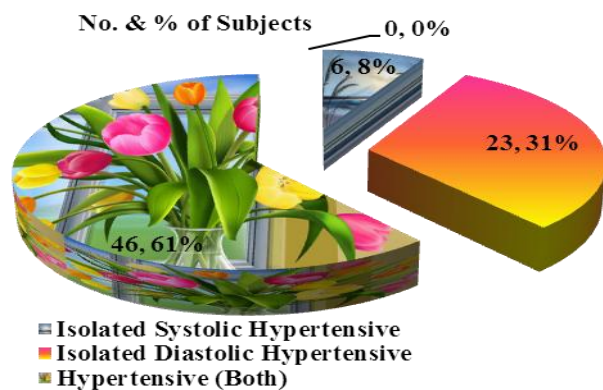


Figure 3: Distribution of Hypertensive Subjects according to Characteristics of BP Reading (n=75)

4. Discussion

In the present study 535 employees of BMTC were included. In the studied sample the prevalence of hypertension was found to be 14.02%. The observed prevalence was higher than WHO [11] criteria of the prevalence of hypertension which is 11% in men and the reported prevalence of 13.1% in males from urban Chandigarh in Thakur K [12] et al study. The difference may be attributed to the different characteristics of under study population as well as WHO criteria, as HTN is more a lifestyle disorder. In 2002 Gupta R [13] et al reported higher prevalence from Jaipur i.e. 30% in males and it was age adjusted prevalence and Swamy HM [14] et al reported 58% prevalence in a small sample size; such a high prevalence was probably because of inclusion of more elderly subjects in reference study, but in present study most of the subjects were of younger age groups and it is known fact that incidence of hypertension increases with age.

In the present study the observed prevalence was less than the reported national prevalence of 25%, [13, 15] it may be due to small sample size in present study and inclusion of a minor section of society of a region. The observed prevalence may not be the precise prevalence as only 1000 employees are working at study site out of more than one lac employees in BMTC.

In the present study 58.7%, 17.3% and 5.10% hypertensive volunteers were of mild, moderate and severe grade hypertension respectively, while 18.7% were on AHD (anti-hypertensive drug) and their blood pressure was controlled but in the prevalence study all new and old (known cases) cases are included. Regarding the characteristics of BP reading in hypertensive subjects, 8% were found to be of isolated systolic hypertension (ISH), 31% were found to be of isolated diastolic hypertension (IDH) and 61% of both ISH and IDH. International Society of Hypertension mentioned that the IDH is more dangerous than the ISH.

5. Conclusion

The present study reveals that overall 14.02% (75) of the employees of BMTC were hypertensive.

In the present study 18.7% were on AHD and their blood pressure was controlled. In the present study 58.7% hypertensive were of mild grade, hence this demands urgent in lifestyle modifications and change in dietary habit, so that transition to moderate HTN could be prevented because AHD has some its own hazards. Though AHD successfully controlled the hypertension but our aim is primary prevention.

Recommendations

Hypertension is significantly prevalent among BMTC employees. These data definitely support for the prevention and management of hypertension, a better way to the said field, and to achieve the goal of primary prevention because a small reduction in average blood pressure of a population would produce a large reduction in the incidence of vascular complications such as stroke and coronary heart diseases on long term basis.

References

- [1] Gupta P.C. et al. *Research letter: Hypertension prevalence and blood pressure trends in 88653 subjects in Mumbai, India.* Journal of Human Hypertension. 2004;18: 907-910.
- [2] Siddarth N.S. et al., 2008: *API Textbook of Medicine.* Vol.1, 8th Ed. Mumbai: Association of Physicians of India. 531-533.

- [3] Todkar S.S. et al. *Period Prevalence and Socio demographic Factors of Hypertension in Rural Maharashtra: A Cross-Sectional Study*. Indian Journal of Community Medicine 2009. 34 (3) 183-187.
- [4] Gupta R. *Trends in hypertension epidemiology in India*. J Hum Hypertens. 2004. 18 (2) 73-8.
- [5] Wenyue Pang et al. *Prevalence of hypertension and associated factors among older rural adults: results from Liaoning Province, China*. Medical principles and practice international Journal of the Kuwait University Health Science Centre. 2010. 19 (1) 22-27.
- [6] Giuseppe M. et al. *Epidemiology of Hypertension*, chapter in Manual of Hypertension of the European Society of Hypertension. Part 2. London. Informa Healthcare UK Ltd. 2008. 11,13,15,98.
- [7] Park K., 2009: *Textbook of Preventive and Social Medicine*. 20th Ed. Jabalpur: Banarsidas Bhanot. 306, 325-26,319.
- [8] Mahajan B.K., 2006: *Methods in Biostatistics for medical students and research workers*. 6th Ed. New Delhi. Jaypee Brothers Medical Publishers (P) Ltd. 92-94.
- [9] Rao NSN et al., 2008: *Applied Statistics in Health Sciences*. 1st Ed. New Delhi. Jaypee Brothers Medical Publishers (P) Ltd. 105-107.
- [10] Giuseppe Mancia et al. *2007 guidelines for management of arterial hypertension*. J. Hypertens. 2007.25 (6) 1113-18.
- [11] Gupta R et al. *Prevalence and determinants of hypertension in the urban population of Jaipur in western India*. J. Hypertens. 1995. 13 (10) 1193-200.
- [12] Thakur K et al. *Health awareness and treatment compliance of high blood pressure among women in a peri-urban colony of Chandigarh, India*. J Indian Med Assoc. 1999. 97; 217-219.
- [13] Gupta R. et al. *Prevalence of Coronary Heart Disease and Risk Factors in an Urban Indian Population: Jaipur Heart Watch-2*. Indian Heart J. 2002. 54 (1) 59-66.
- [14] Swami H.M. et al. *Population based study of hypertension among the elderly in northern India*. Public Health. 2002. 116 (1) 45-9.
- [15] Gupta R. et al. *High Prevalence of Multiple Coronary Risk Factors in Punjabi Bhatia Community: Jaipur Heart Watch-3*. Indian Heart J. 2004. 56 (6) 646-52.

Status of Hepatitis-B Virus Carriers in the Patients of NIUM Hospital

Abdul Haseeb Ansari¹, Mohd. Zulkifle², Mohd. Akmal³, Mohd. Shakir³

^{1,2,3} Department of Tahaffuzi wa Samaji Tib, National Institute of Unani Medicine, Kottigepalya, Bangalore, Karnataka, India

Correspondence should be addressed to Abdul Haseeb Ansari, ahansari_001@rediffmail.com

Publication Date: 21 November 2012

Article Link: <http://medical.cloud-journals.com/index.php/IJAAYUSH/article/view/Med-15>



Copyright © 2012 Abdul Haseeb Ansari, Mohd. Zulkifle, Mohd. Akmal and Mohd. Shakir. This is an open access article distributed under the **Creative Commons Attribution License**, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Abstract Chronic Hepatitis-B is a common disease with an estimated global prevalence of more than 300 million carriers, or approximately 5% of the world's population. The prevalence of Hepatitis-B Virus (HBV) varies widely in different parts of the world. Local factors influence the prevalence of HBV infection in a particular community including the ethnic mixture of the populations, frequency of injection drugs use and proportion of the population engaging in the high risk sexual activity. The overall carrier rate in India is often quoted as being 4.7%. Chronic hepatitis-B infection may occur as a chronic persistent and chronic active hepatitis, which eventually leads to liver cirrhosis and hepatocellular carcinoma (HCC). HBV vaccine is highly effective. More than 95% of patients develop antibody against surface antigen, and the attack rate of HBV infection is only 3.2% in vaccine recipients. The present study was a cross-sectional hospital based survey, embarked upon to know the prevalence of HBV carriers in patients attending NIUM, to evaluate the awareness in people about the vaccination, and to create the awareness in the patients and the paramedical staff of the NIUM hospital during the study. A total of 903 patients irrespective of age and sex were included in the study. Information related to demography, anthropometry, personal history, and family history of HB infection, liver cancer and jaundice was obtained through pre-tested, semi-structured schedule. Venous blood samples were drawn for HBsAg detection. To create the awareness regarding the HBV infection, all patients were educated about the risk factors, complications, routes of transmission, treatment and the prevention. The overall prevalence of HBV infection in the study population was 2.18%. The prevalence of HBV infection in the age group 1-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70 & above was as 10%, 21%, 37%, 5%, 16%, 11% and 0% respectively. The prevalence of HBV infection in volunteers of habit of addiction was as 27% in smokers, 5% in alcoholics, 5% in both smokers and alcoholics. The persons found positive for HBV infection were all non-vaccinated. The prevalence in Married volunteers was 79% and in Un-married it was 21%. The prevalence was 89% in those volunteers who did not have the knowledge about Hepatitis-B and only few 11% volunteers have given the family history of Hepatitis-B and Blood transfusion etc.

Keywords Hepatitis-B, Prevalence, HBsAg, HBV Infection, HBV Carriers

1. Introduction

Hepatitis-B is life threatening disease which is contributing a large man power as well as economical loss worldwide. It is a serious and common infectious disease of the liver, affecting millions of people worldwide. Hepatitis-B Virus (HBV) infection is such a disease which has what we call it the “healthy carriers” in the community. Fortunately HBV infection can be detected early by testing the serum of individual for the presence of HBsAg (hepatitis-B surface antigen) and steps can be taken in time to avoid further damage to liver [1].

HBV can cause the acute as well as chronic infection. Acute hepatitis implies a condition lasting less than 6 months, culminating either in complete resolution of the liver damage with return to normal liver functions and structure or a rapid progression of the acute injury towards extensive necrosis and a fatal outcome. Chronic hepatitis is defined as sustained inflammatory process in the liver lasting longer than 6 months [2]. It can progress towards the cirrhosis of the liver, liver cancer, liver failure and death. Persons with chronic infection also serve as reservoir and source for continued HBV transmission [1]. If we observe the “Iceberg Phenomenon” of the disease in which the floating tip of the iceberg represents what the physicians see in the community i.e. clinical cases. The vast submerged portion represents the hidden mass of the disease i.e. latent, unapparent, presymptomatic, undiagnosed cases and carriers in the community [3]. The bottom of the iceberg shows the individuals which look apparently healthy but they are at high risk of developing the disease in future, so there is a need of such methods or procedures which can diagnose such type of individuals in early stage so that early treatment or early measures can be adopted to minimize the related morbidity and mortality.

Screening is one of the procedures by which disease can be diagnosed in its early stage and the possible steps can be adopted in time to reduce the morbidity and mortality e.g. BP for hypertension and Pap smear for cancer of cervix are two example of how screening helps in combating the fatal outcomes of diseases.

Hepatitis-B is the 10th leading cause of death in the world, on the other hand hepato-cellular carcinoma (HCC) ranks 5th among the most frequent cancer in human [2]. Now hepatitis-B is becoming a public health problem of increasing concern worldwide, especially in developing countries. Globally about 2 million people are infected with HBV, 350-400 million are chronic carriers and tens of millions of new cases occur annually, of those infected 15-40% develops cirrhosis or hepato-cellular carcinoma [1]. According to WHO survey more than 2000 million people alive today have been infected with HBV at some time in their life, of these, about 350 million remain infected chronically and become carrier of the virus. Three quarters (3/4) of the world's population live in high endemicity areas. Every year 4 million acute clinical cases of HBV occur and about 25% of them become carriers. One million people a year die from chronic active hepatitis, cirrhosis or primary cancer [1].

In India hepatitis-B is a major health problem with an intermediate prevalence of HBsAg i.e. 2-10% [4, 5]. The overall carrier rate is often quoted as 4.7% [6] based on meta-analysis [7]. The number of HBsAg carriers in India has been estimated to be over 40 million (4 crore).

2. Materials and Methods

The present study was a cross-sectional study conducted in the Hospital of National Institute of Unani Medicine (NIUM), Kottigepalya, Bangalore on 903 patients of any age group and sex, to know the prevalence rate of Hepatitis-B virus carriers by taking every 10th patient attending NIUM, irrespective of the treatment, patient seeking for. The duration of the study was 6 months. Sample size was calculated statistically taking the previous prevalence as reference. Awareness based pre-tested

schedule was administered to each patient to collect the data on socio-demographic profile and the other data of relevance viz. history about vaccination, smoking, drinking, unprotected sex, needle prick injury, intravenous drug abuse, and tattooing the skin etc. anthropometric measurements (standing height and weight) of the patients were recorded using the standard methodology. An informed consent for blood sample collection was obtained from every patient. One (1) ml of venous blood was drawn from each patient, with appropriate antiseptic precautions and collected in plane sterile glass test tube and then allowed to clot. The tests were performed according to the manufacturer's instructions provided in the kit (SD standard diagnostic, INC. KOREA) [8] which were based on immuno-chromatographic principle. The patients so found positive for HBsAg were retested and then referred to higher centre for further conformation and appropriate management they deserve.

3. Observations and Results

Table 1: Distribution of Patients according to Outcome of Screening Test (n=903)

Outcome of Screening Test	No. of Patients	Percentage (%)
+ve	19	2
-ve	884	98
Total	903	100

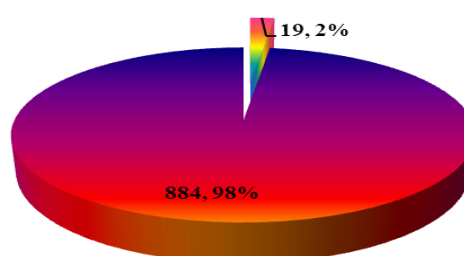


Figure 1: Distribution of Patients according to Outcome of Screening Test (n=903)

Table 2: Distribution of +ve Patients according to Age (n=19)

Age	No. of Patients	Percentage (%)
1-19	2	10
20-29	4	21
30-39	7	37
40-49	1	5
50-59	3	16
60-69	2	11
70 & above	0	0
Total	19	100

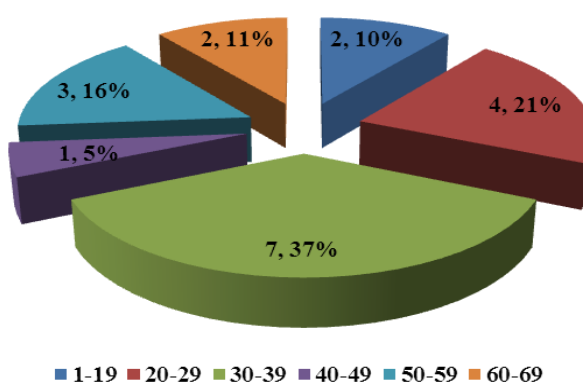


Figure 2: Distribution of +ve Patients according to Age (n=19)

Table 3: Distribution of +ve Patients according to Addictive Habit (n=19)

Addictive Habit	No. of Patients	Percentage (%)
Smoking	5	27
Tobacco chewing	0	0
Alcoholism	1	5
Alcoholism and smoking both	1	5
No	12	63
Total	19	100

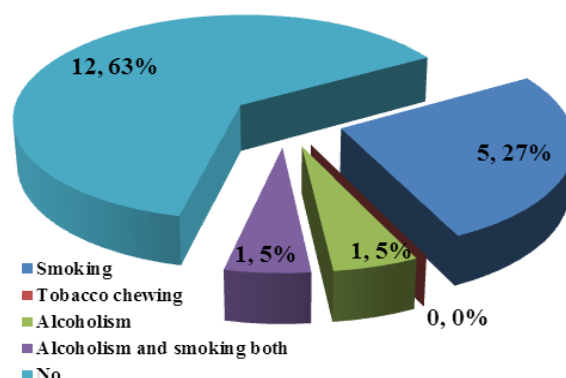


Figure 3: Distribution of +ve Patients according to Addictive Habit (n=19)

Table 4: Distribution of +ve Patients according to Vaccination Status before Infection (n=19)

Vaccination Status	No. of Patients	Percentage (%)
Vaccinated	0	0
Non-Vaccinated	19	100
Total	19	100

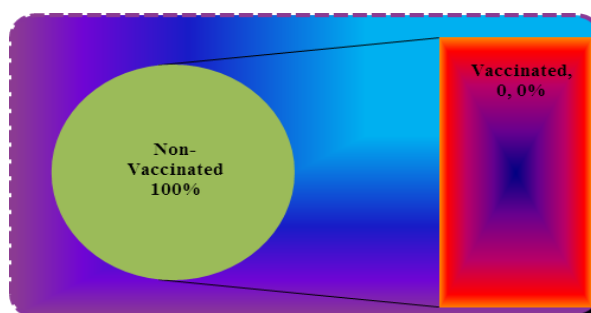


Figure 4: Distribution of +ve Patients according to Vaccination Status before Infection (n=19)

Table 5: Distribution of +ve Patients according to Marital Status (n=19)

Marital Status	No. of Patients	Percentage (%)
Married	15	79
Unmarried	4	21
Total	19	100

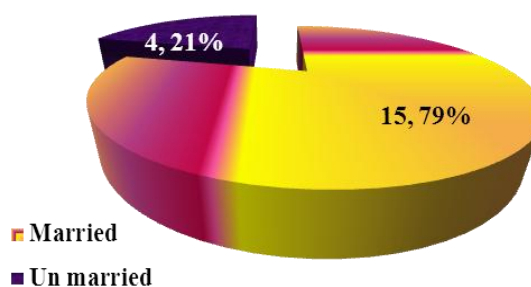


Figure 5: Distribution of +ve Patients according to Marital Status (n=19)

Table 6: Distribution of +ve Patients according to Family History of Hepatitis-B Infection (n=19)

Family History of Hepatitis-B Infection	No. of Patients	Percentage (%)
Yes	2	11
No	17	89
Total	19	100

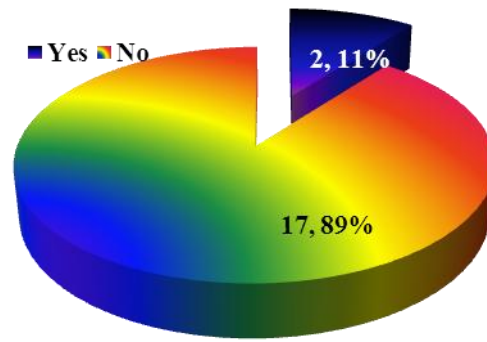


Figure 6: Distribution of +ve Patients according to Family History of Hepatitis-B Infection (n=19)

Table 7: Distribution of +ve Patients according to History of Blood Transfusion (n=19)

History of Blood Transfusion	No. of Patients	Percentage (%)
Yes	2	11
No	17	89
Total	19	100

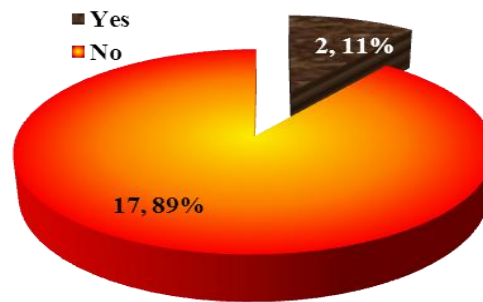


Figure 7: Distribution of +ve Patients according to History of Blood Transfusion (n=19)

Table 8: Distribution of +ve Patients according to Education Status (n=19)

Education Status	No. of Patients	Percentage (%)
ILT	9	48
1-5	1	5
6-8	1	5
9-10	3	16
PUC	0	0
GRA	4	21
PG	1	5
Total	19	100

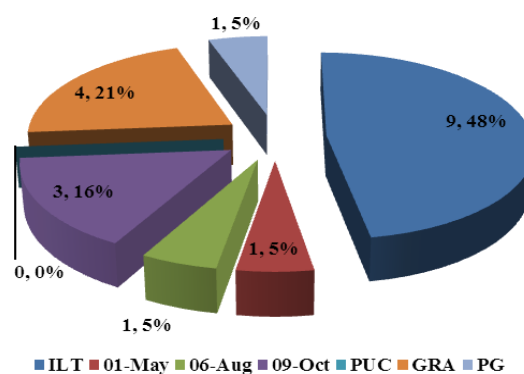


Figure 8: Distribution of +ve Patients according to Education Status (n=19)

Table 9: Distribution of +ve Patients according to Occupation (n=19)

Occupation	No. of Patients	Percentage (%)
Unemployed	14	74
Semiskilled	4	21
Skilled	0	0
Professionals	1	5
Total	19	100

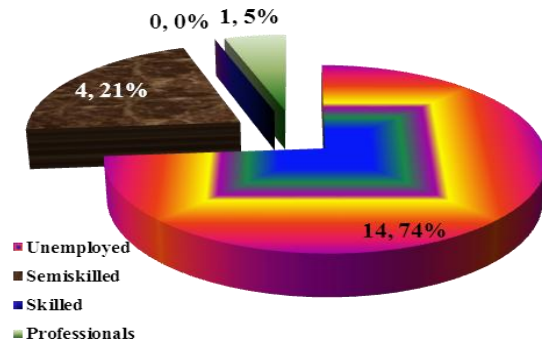


Figure 9: Distribution of +ve Patients according to Occupation (n=19)

Table 10: Distribution of +ve Patients according to Knowledge about Hepatitis-B (n=19)

Knowledge about Hepatitis-B	No. of Patients	Percentage (%)
Yes	2	11
No	17	89
Total	19	100

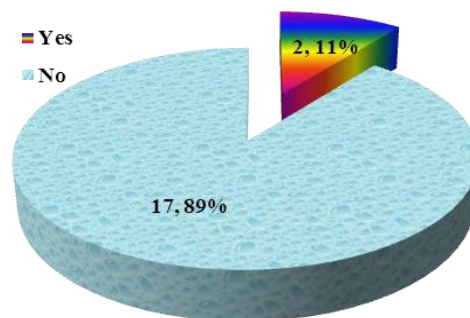


Figure 10: Distribution of +ve Patients according to Knowledge about Hepatitis-B (n=19)

4. Discussion

In the present study, as shown in Table 1 & Figure 1, out of 903 only 19(2.18%) patients were found positive (+ve) in the screening for HBsAg.

Age wise distribution of +ve volunteers was as, out of 19, 2(10%), 4(21%), 7(37%), 1(5%), 3(16%), 2(11%) patients were observed in age group of 1-19, 20-29, 30-39, 40-49, 50-59, 60-69 years respectively and no (0%) patient was in 70 & above years age group, as shown in Table 2 & Figure 2. The maximum percentage of +ve volunteer was found in age group 30-39. This is the same age group in which maximum 25% volunteer were enrolled. This higher prevalence may be because of higher number of patients in this age group.

It was observed that percentage of smokers was found more in HB +ve volunteer i.e. 27% contrary to 15% of the studied sample, as shown in Table 3 & Figure 3. Percentage of alcoholics was also higher 5% contrary to 1%. The percentage of both alcoholics and smokers was almost similar in positively tested and under studied sample i.e. 5% and 4% respectively. Higher percentage of alcoholics in the

positively tested volunteers may have some relevance with HBV careerism. This aspect should be studied taking a large sample; only then the definite association can be established. Otherwise it may be an incidental observation in the present study. Documentation of this association could not be traced in the literature.

The vaccination status of the studied sample revealed that only 2%(15) volunteers received vaccines against HB, but in positively tested volunteers no one was found vaccinated against the disease, as shown in Table 4 & Figure 4. Preventive efficacy of HB vaccine is well established if given prior to contacting the infection. So far as efficacy of the vaccine in clearing the HBsAg from the circulation is concerned, it is not well proved and in some studies it has been documented that if the vaccine is given after contacting the diseases, it is of no use [9, 10, 11, 12, 13, 14, 15].

As shown in Table 5 & Figure 5, 79%(15) volunteers from the +ve patients were married and the percentage of married in the +ve volunteers was almost similar to the percentage of married in studied sample. Though, it was little less than the sample percentage i.e. 83% v/s 79%.

Regarding the presence of risk factors, the present study revealed that 11% of positively tested volunteers have positive family history of HB, as shown in Table 6 & Figure 6. Close contact with HB +ve person greatly enhances the chance of transmission as presence of virus has been documented in several body fluids [12, 13, 16, 17, 18, 19, 20, 21, 22]. The chances of higher transmission are also revealed by the study of Choudhry A et al, in which they have reported 2.96% prevalence of HB in family members of asymptomatic carriers from West Bengal. 11% of positively tested patients gave the history of the blood transfusion, as shown in Table 7 & Figure 7. Though, in the present days maximum precautions are taken to avoid the transfusion of contaminated blood. But in spite of all precautions this route of transmission topped the list of transmission [12, 13, 16, 17, 18, 19, 20, 21, 22]. It might be possible that this fraction of the positive volunteers had acquired the infection during transfusion, as no patient could revealed detail about the condition of transfusion whether blood was screened and who was the donor etc.

In the present study the prevalence of HB carriers was found to be 2.18%, as shown in Table 1 & Figure 1. The reported prevalence from earlier studies in India was higher, lower and similar. The specification of present study was that it was conducted in general population while all other studies conducted, till date, were from specific section of the society. Most of the previous studies were conducted in VBD (volunteer blood donor), RBD (replacement blood donor) and antenatal, sexually transmitted disease (STD) clinics. Singhvi et al reported the prevalence of HBV infection as 2.84% from Vellore in 1990, this study was conducted in VBD and RBD. This section of the society is screened mandatorily so, every donor is at equal chance of being tested positive. The 0.6% difference in the present study may be attributed to the differences in characteristic of under study population. Almost same prevalence i.e. 2.59% reported by Thakur et al from Himachal Pradesh in VBD, once more the reported difference is not much from the observed prevalence in present study. The difference whatever it may be attributed to the 100% screening of the entire blood donor while in the present study every 10th patient was taken as volunteer from registration register, which was 10% of the total. Elavia AJ et al reported exactly the same prevalence as in present study i.e. 2.02% from Blood donor's community from Bombay. Irshad M et al reported little higher prevalence as 2.59% from Jodhpur in VBD. Nijhawan S et al reported almost similar prevalence as 2.1% from Navi Mumbai in community of VBD. Ahmed B et al from Jodhpur reported the prevalence as 2.4% from general community. Joshi et al also reported almost same prevalence as 2% from Chandigarh in VBD. From Lucknow Singh H et al (2003) reported the same prevalence as 2.05% in VBD. Warner GT et al from rural Punjab community has reported a higher prevalence as 3.4%, this reported prevalence was higher than the observed prevalence in RBD and VBD community from same state. This difference in prevalence may be attributed to the characteristics of the under studied population. This prevalence was reported in 1989, contrary to Warner et al, Kaur U et al reported the prevalence as 2.93% from

student community of Chandigarh in 1996 almost 10 years later from Werner et al. Surprisingly Singh J et al (2000) reported the prevalence of HBV as 4.2% from two urban population of Bangalore, while in present study the observed prevalence from the same community of Bangalore was 2.18%. The difference is almost of two folds. This difference may be attributed to increasing knowledge and awareness about HB, increasing level of the education of Bangalore population and inclination towards the vaccination of HB of urban population because of the campaign for HB prevention. The mass media helped a lot in raising the level of awareness among general population about Hepatitis-B; this may be called as HB sensitization. Higher level of this sensitization may be the sole factor for the observed difference. Similarly Chandrashekharan S et al reported the higher prevalence as 4.12% from Madurai in VBD. This study reflects the same trends of prevalence as reported by Singh J et al as both study were conducted in the same year 2000. 3.43% prevalence has been reported by Garg S et al from Jodhpur in VBD community in 2001. This higher prevalence of Garg S et al can be attributed to the composition of the sample regarding the awareness, vaccination, exposure and occupation. As, all these factors influence the chances of acquisition of HB [23, 24]. Ganju SA et al reported the prevalence of HB as 3.5% in antenatal and STD clinic attendees from Jodhpur. 3.5% is about 1.5 times higher than observed prevalence of 2.18% of the present study. This difference is clearly because of the difference in characters of the under studied population. STD is the documented risk for HB transmission. Though the Ganju SA et al study comprises of antenatal women also but the number of the patients who were suffering from the STD and their number of sexual partners and their HB status, vaccination status and sexual behaviour have not been mentioned anywhere by the authors but definitely this section of society is at higher risk of contacting the HB infection. In present study no patient was found suffering from STD neither any patient having the history of multiple sex partners and 80% population was married means protected from unsafe sex. Mahalaxmi B et al from community of eye donor from Chennai reported the prevalence of HBV as 3.5% which is 1.5% times more than the observed prevalence in the present study. The difference may be attributed to the compulsory and extensive testing of all eye donors for HB by advanced technique with higher sensitivity and specificity than screening test. The patients escape, detection in screening may be detected by advanced technique of the testing. Another factor may be compulsory testing of all donors. Definitely Mahalaxmi B et al reported the results of 100% tested population whereas in our study 10% of the population was screened. Benerjee A et al in their study reported prevalence of HBV as 3.75% from an antenatal (AN) mother community from Calcutta, which was higher, as compared to the present study's prevalence of 2.18%. The difference may be attributed to the characteristics of under studied population i.e. AN mothers with small sample size (400) of Benerjee A et al study. Another factor may be the compulsory screening of all mothers at antenatal care (ANC) clinic in reference study. In the present study not even a single pregnant happen to include.

The prevalence of almost every disease whether communicable or non-communicable greatly influenced by certain socioeconomic characteristics of the population. Education level clearly influenced the knowledge regarding the disease, its spread, consequences and methods of prevention. In the present study, as shown in Table 8 & Figure 8, only 25% positively tested patients were educated beyond PUC level. Illiteracy and ignorance run hand in hand, and both are intimately related to the transmission of HB.

Occupation plays pivotal role in living standard. In the developed countries so many infectious diseases have been brought under control simply by better standard of living. In the present study about 80% of the positively tested patients, as shown in Table 9 & Figure 9, were belonging to low socioeconomic group which is considered vulnerable to the transmission of infection because of various social factors like overcrowding, ill ventilation, poor sanitation, lack of awareness, ignorance towards vaccination etc.

As shown in Table 10 & Figure 10, in the present study only 11% of the positively tested volunteers were having the knowledge about Hepatitis-B.

In the present studied sample no one was found with history of intravenous drug (IVD) abuse and tattooing. These two considered amongst the high risk factors for the transmission of HB. Fortunately the under study population was found safe from these two factors along with little percentage of the major risk factor i.e. blood transfusion.

In spite of being the metro, high-tech, and costliest city of the world, very few studies about the prevalence of HBV infection have been conducted in Bangalore city. WHO has reported in its report of August 2002 mean HB prevalence as 4.5%, this mean was extracted from three studies conducted in general population of Karnataka. Only one of them was from Bangalore city. Separately these studies have reported the prevalence as, 3.25% (Rajamundry), 4.16% (Bangalore) and 7.11% (Gulbarga).

5. Conclusion

In the present study maximum aspect of HB prevalence were covered and detailed information on every aspect were obtained with maximum efforts and to the best of precise level. All these informations have been presented here in systematic way. Because of the temporal constraints and lack of facilities, centre of focus was on screening the patients for HBsAg. The present study was conducted to know the burden of hepatitis carrierisms in the Bangalore city so that concrete program may be formulated, planned and implemented.

References

- [1] Anonymous. World Health Organisation, Department of Communicable Disease. Surveillance and Response Hepatitis B. 2002. Report No. WHO/CSR/LYO/2002.2.
- [2] Chen D.S. *Toward Elimination and Eradication of Hepatitis-B*. Journal of Gastroenterology and Hepatology. 2010. 25; 19-25.
- [3] Park K., 2007: *Textbook of Preventive and Social Medicine*. 19th Ed. Jabalpur, Banarsidas Bhanot, 36.
- [4] Kant L., et al. *Epidemiology of Childhood Hepatitis in India: Vaccination Related Issues*. Indian Journal of Paediatrics. 1995. 62; 635-653.
- [5] Sarin S.K. *HBV Prevalence, Natural History, and Treatment in India and Indian Americans in United States*. Current hepatitis reports. 2009. 8; 31-38.
- [6] Mann A., et al. *Prevalence of Hepatitis-B Virus, Hepatitis-C Virus, and HIV in Patients with Chronic Liver Disease in Amritsar*. JIACM. 2007. 8 (1) 29-37.
- [7] Khan M.A., et al. *Prevalence of HBV, HCV, HIV in Blood Donors at Liyaqatpur*. Professional Medical Journal. 2006. 13 (1) 23-26.
- [8] Pichainarong N. *Hepatitis-B Carrier among Married Hilltribe Women in Northern Thailand*. Southeast Asian Journal of Tropical Medicine and Public Health. 2003. 34 (1) 114-199.
- [9] Medalinski K., 2010: *Recent advances in hepatitis-B vaccination*. [<http://hepatitisbannual.org>]
- [10] Wilson R.A., 1997: *Viral Hepatitis*. New York, Marcel Dekker, 85-117.

- [11] Jain A.K., et al. *Hepatitis-B Vaccine in the EPI Schedule*. Indian Journal of Paediatrics. 2005. 72 (8) 661-664.
- [12] Anonymous. *A Comprehensive Immunization Strategy to Eliminate Transmission of Hepatitis-B Virus Infection in the United States*. Department of Health and Human Services, Centre for Disease control and prevention. 2006. 55 (RR-16) 1-40.
- [13] Anonymous. *Recommendations for Identification and Public Health Management of Persons with Chronic Hepatitis-B Virus Infection*. Department of Health and Human Services, Centre for Disease control and prevention. 2008. 57 (RR-8) 1-28.
- [14] Anonymous. *Implementation of Newborn Hepatitis-B Vaccination-Worldwide, 2006*. Department of Health and Human Services, Centre for disease control and prevention. 2008. 57 (46) 1250-1272.
- [15] Hassan M.S., et al. *HBsAb measurement after hepatitis-B vaccination and introduction of non-Responders person*. Research journal of biomedical Sciences. 2007. 2 (5) 534-537.
- [16] Carey W.D. *The Prevalence and Natural History of Hepatitis-B in the 21st Century*. Cleveland Clinic Journal of Medicine 2009. 76 (3) 52-55.
- [17] Mahoney F.J. *Update on Diagnosis, Management and Prevention of Hepatitis-B Virus Infection*. Clinical Microbiology Reviews. 1999. 12 (2) 351-366.
- [18] Feldman M., et al., 1998: *Sleisenger and Fordtran's Gastrointestinal and liver Disease*. Vol.2. 6th Ed. WB Saunders Company, 1123-1170.
- [19] Singh J., et al. *Community Studies on Prevalence of HBsAg in Two Urban Populations of Southern India*. Indian Journal of Paediatrics. 2000. 37; 149-152.
- [20] 2010: *Vaccine Information for the public and health professionals*. [<http://www.vaccineinformation.org/hepb>].
- [21] Risbud A., et al. *Prevalence and Incidence of Hepatitis-B Virus Infection in STD Clinic Attendees In Pune, India*. Sex Trans Infeel. 2002. 78; 169-173.
- [22] Anonymous. *Surveillance for Acute Viral Hepatitis-United States 2007*. Department of Health and Human Services, Centre for disease control and prevention. 2009. 58 (SS-3) 1-32.
- [23] Batham A., et al., *Systematic Review and Meta-Analysis of Prevalence of Hepatitis-B in India*. Indian Paediatrics. 2007. 44; 633-674.
- [24] Sudan S.S., et al., 2010: *Prevalence of Hepatitis-B and C in CRF Patients on Maintenance Haemodialysis*. [http://www.bhj.org/journal/2003_4502_april/index.htm].