Health and Population
Perspectives and Issues 28 (4): 164-177, 2005

KNOWLEDGE OF ADOLESCENTS ON CONTRACEPTION AND DYNAMICS OF ITS USE

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ABSTRACT

Adolescence is a'chtical period, especially for the married female adolescents, as they have to enter early into the marital life that pushes them to bear the consequences of childbearing. Although adolescents have knowledge on contraceptives, but their use of contraceptives is low. Quantitative data on 1,881 married female adolescents revealed that almost cent per cent of the married adolescents are aware of at least one contraceptive method. But the current use rate is low. Muffi-variate logistic regression analysis revealed that current age, attitude of the family members towards contraceptive use, marital duration and husband-wife communication appeared to be important predictors of contraceptive use. To meet the family planning and other reproductive health, needs of adolescents, field workers - need to make greater efforts to extend their services to relatively younger and childless couples. Efforts on behavioural change communication (BCC) are needed to ensure the participation of young spouses in family planning and other reproductive health services. Another important action to be undertaken for the development of supportive structure at the community and also at the family level is enhancing the educational attainment of females which would help discourage the pattern of early marriage and childbearing.

Key words; Contraception, Adolescent, Knowledge and Bangladesh.

Bangladesh has passed a remarkable demographic transition period. The total fertility rate (TFR) has declined from six children, per woman of reproductive age in the early 1970s to little over three children per woman in 2000, which is a decline of about 50 per cent over a period of 30 years. Contraceptive prevalence .rate (CPR) has increased from about 7 per cent to 54, per cent during this period. This dramatic shift in the demographic indicator took place in the absence of

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significant improvement in the socio-economic condition, persistent poverty, high mortality, low literacy rate especially for women and early marriage of girls etc. To reach the goal of achieving replacement fertility by the year 2005, further increase in the CPR is necessary, the previous studies found that the CPR for married women aged-less tharf20 years is only 24 per cent compared to a CPR of 44 per cent for women in 20-29 years of age group. In the BDHS survey (2000), 38.1 per cent of the married adolescents are using any family planning method compared to 47.1 per cent in the age group of 20-24 years. With increasing age, the CPR increased to 61.9 per cent in the age group of 40-44 years. This indicates that much of the increase in contraceptive prevalence is attributable to higher rates of contraceptive use and family planning acceptance by relatively older and higher parity couples. Married women aged less than 25'years represent one-third of the country's reproductive age women. This group has a tremendous influence on contraceptive, prevalence and fertility during the next ten years. Variety of factors might influence the contraceptive practice among the adolescents, such as desired family size and child spacing, contraceptive prevalence among married women at the individual level and at the macro level, laws and regulations and cultural norms are important .factors that determine the access to contraception[3]. The contraceptive, use is gradually increasing in Bangladesh, it. is still low compared with any developed country and even many, developing countries, Since the average age at manage in Bangladesh rernains the lowest, a large proportion of the potential acceptors of contraception are married adolescents. No exclusive and comprehensive study on the contraceptive behaviour of married adolescents in Bangladesh has been undertaken, So, an attempt was made to analyze the knowledge on contraceptive method among the currently married adolescents. Determinants of contraceptive use among the adolescents have been explored through bivariate and multivariate logistic regression analysis and the results obtained are presented,

MATERIALS AND METHOD

This was a cross-sectional study conducted in both rural and urban areas of Bangladesh. The married female adolescents aged 10-19 years constituted the study population. A multi-stage cluster sampling technique was' adopted to select the sample. Both quantitative and qualitative study designs were followed to collect relevant data on knowledge on contraception and its pattern of current use. Data of 1,881 adolescents excluding the currently pregnant, widow, divorced and separated adolescents were analyzed. Data were collected by face-to-face interview, using a predesigned interview schedule consisting of questions related

to knowledge on contraception, correct knowledge on timing of use, current practice of contraception and sources of contraception. Both uni-variate and bi-variate analyses were performed. Multi-variate logistic regression analysis was used to identify the socio-economic, demographic and behavioral factors influencing current practice of contraception. Data were analyzed using Statistical Package for Social Science (SPSS, version 11.5). To substantiate the results of quantitative study, a series of focus group discussions were conducted among the adolescents.

FINDINGS

Socio-Demographic Characteristics

The mean age of the respondents was 16.9±1.5 years with a range of 12 to 19 years. Their mean years of schooling was 4.0±3.3 years. Among them, 31.2 percent was illiterate, 35.0 per cent had 1-5 years of schooling and the rest had 6 and above years of schooling. Whereas, the mean years of schooling was 4.7±3.4 years for husband. Among them 19.4 per cent was illiterate, 42.4 per cent had 1-5 years of schooling and the rest had 6 and above years of schooling (38.0%). Regarding parental education, more than half (52.5%) of the fathers were illiterate whereas about four-fifths (77.8%) of the mothers were illiterate indicating that mothers were more illiterate than fathers. The mean family size was 4.9 persons. More than one-third (36.2%) of the adolescents were currently engaged in different income generating activities other than household work. The majority of the respondents were Muslims (89.3%) and only 10.7 per cent was non-Muslims. About half of the adolescents (49.1%) were from nuclear families and the rest from joint or extended families (50.9%). The median family income was Taka 2500.0. (Table 1).

Contraceptive Knowledge and Its Use

Usually knowledge on contraceptive, methods refers to whether a respondent heard of or know of a family planning method or methods. Islam *et al.,* (1995)[4] opined that contraceptive knowledge or awareness logically precedes contraceptive use and it is therefore, important to know if women have proper knowledge of contraceptives or of specific contraceptive methods. In the study, data on knowledge on contraception was collected by asking question on ever heard of any contraceptive method. Spontaneous responses were considered for analysis.

TABLE 1

SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE ADOLESCENTS (N=1881)

Characteristics	Frequency	Per cent	Mean ± SD
Age in years			
10-14	123	6.5	16.9±1.5.
15-19	1758	93.5	
Residence			
Rural	1390	73.9	
Urban	491	26.1	
Years of schooling (Respondents)			
0	587	31.2	4.0±3.3
1-5	658	35.0	
' >6	636	33.8	
Years of schooling (Husband)			
0	369	19.6	4.7±3.4>
1-5	797	42.4	
£6	715	38.0	
Religion			
.Non-Muslim	202	10.7	
Muslim	1679	89.3	
Literacy (Father)			
Illiterate	987	52.5	
Literate	894	47.5	
Literacy (Mother)			
Illiterate	1464	77.8	
Literate	417	22.2	
Work status			
No	1200	63.8	
Yes	681	36.2	
Type of family			
Nuclear	924	49.1	
Joint	957 __	-50.9	
Family size			
2-3	647	34.4	4.9±2.3
4-5	606	32.2	
>6	628 __.	33.4	
Monthly family income (Tk.)			
<2000	414	24.0	Median income= Tk. 2500.0
2000-3000	667	38.6	
3000-4000	401	23.2	
>4000	245	14.2	

Knowledge on Contraception

It may be seen that contraceptive knowledge is almost universal among the adolescents in Bangladesh. Almost all the married adolescents are aware of at least one method of contraceptives. However, it is obvious that knowledge on various methods of contraceptive does not imply that respondents actually know how to use these methods effectively. The most common known method was oral pill (99.3%). Condom is the next known method (85.3%) followed by injectables (72.7%), tubectomy (37.5%), IUDs (34.3%) and traditional methods which were least known methods compared to modern methods, The adolescents knew on an average of 3.6 contraceptive methods (Table 2).

TABLE 2
KNOWLEDGE OF MARRIED ADOLESCENTS ABOUT CONTRACEPTIVES
(N-2256)

Contraceptive knowledge	Frequency	Percent
Yes	2251	99.8
No	5	0.2
*Knowledge pattern of contraceptive methods (n=2251)		
Oral pill	2235	99.3
Condom	1921	85.3
Injectables	1636	72.7
Tubectomy	844	37.5
lUDs	771	34.3
Norplants	328	14.6
Vasectomy	276	12.3
Safe period	82	3.6
Withdrawal	47	2.1
Mean = 3.62 (Range = 1-8)		
Correct knowledge on timing of contraceptive use		
Oral pill (n=2235)	1670	74.7
Condom (n=1921)	1662	86.5
lUDs (n=771)	120	15.6

**Multiple responses*

Knowledge on Timing of Contraceptive Use

The respondents were asked about the effective and correct timing of use of contraceptives for prevention of conception. Three types of contraceptives were given emphasis as their wide reported practice. About 75 per cent of respondents had correct knowledge about the right time of use of oral pill, 86.5 per cent of the respondents had correct knowledge regarding the use of condom and 15.5 per cent had correct knowledge of IUD for prevention of conception.

Current Use of Contraception

The term current use refers to the method which is being currently used by an individual. Thus any respondent (she or her husband) using a contraceptive method at the time of survey is regarded as a current user. The study revealed that only two-fifths (41.3%) of the currently married adolescents are using any contraceptive. The previous surveys reported the same 15 per cent (BFS, 1989), 24.8 per cent in 1993 (BDHS, 1993**)** 31.2 per cent in 1996 (BDHS, 1996)[7] and 36.8 per cent in 2000 (BDHS, 2000). This indicates the rising trend of contraceptive use among the adolescents (Table 3).

Pattern of Contraceptive Use

Among individual methods, oral pill claimed the highest prevalence rate (59.6%) followed by condom (19.2%), injectables (15.2%) and IUDs (2.4%). Permanent method of contraception was the least prevalent method compared to other methods. Only a very small number of adolescents currently practice traditional contraceptive methods (2.5%). In comparison to previous studies, contraceptive prevalence rate among the adolescents has increased since 1989. Most of the increases in CPR are primarily due to increase in modern methods with decreasing trend of permanent and traditional methods (Table.3).

Sources of Contraceptive Use

Regarding the sources of contraceptives, 55.7 per cent of the respondents procured their contraceptives from pharmacies followed by 22.5 per cent from Family Welfare Centres (FWCs), 19.0 per cent from Thana Health Complexes (THCs), 12.6 per cent from field workers, 6.6 per cent from Satellite Clinics, etc. This information indicates that clients procuring contraceptives from government sources are minimum and only a small proportion of the adolescents received contraceptives from the field workers (Table 3).

TABLE 3

CURRENT CONTRACEPTIVE PRACTICE, ITS METHODS, SOURCES OF CONTRACEPTION AND REASONS FOR NOT USING CONTRACEPTION

Variables	Frequency	Per cent
Current contraceptive use		
Yes	777	41.3
No	1104	58.7
Methods of contraception (n=777)		
Oral pill	463	59.6
Injectables	118	15.2
Condom	149	19.2
lUDs	19	2.4
Safe period	12	1.5
Withdrawal		1.0
Vasectomy	4	0.5
Norplants	3	0.4
Tubectomy	1	0.1
***Sources of contraceptives (n=777)**		
Pharmacy	433	55.7
Family Welfare Centre	175	22.5
Thana Health Complex	148	19.0
Field Workers	98	12.6
Satellite Clinic	51	6.6
NGO hospital, clinic	20	2.6
Government hospital	10	1.3
Others	4	0.5
***Reasons for not using contraceptive (n=1104)**		
Wants child	294	26.6
Has breast-feeding child	234	21.2
Husband dislike	185	16.8
Post-partum amenorrhoea	146	13.2
Fear of side-effects	125	11.3
Problem in use ,	87	7.9
Self dislike	35	3.2
Seldom sexual intercourse	9	0.8
Unable to conceive	7	0.6
No knowledge	1	0.1
Others	7	0.6

*Multiple responses

Reasons for not Using Contraceptive

Regarding the reasons for non-use of contraceptives, 26.6 per cent of the adolescents reportedly said that they want children followed by the breast-feed their children (21.2%), husband dislikes (16.8%), post-partum amenorrhoea (13.2%) and fear of side-effects (11.3%) (Table 3).

Correlates of Current Contraceptive Use: Multi-variate Analysis

The logistic model was fitted by considering current use of contraceptive as the dependent variable which was dichotomized by assigning T for use of any method and '0' for non-use of any method. The explanatory variables which were significant in bi-variate analysis were entered into logistic regression model. The explanatory variables were age of the respondents, years of schooling of both husband and wife, level of education of mother, attitude of family members towards family planning, duration of marriage, husband-wife communication for family planning and number of living children. Table 4 presents the estimates of the logistic regression co-efficients (J3) corresponding to the selected explanatory variables, odds ratio and their 95 per cent confidence intervals. Variables which have no significant association in bi-variate analysis were not included in multivariate analysis. According to the fitted model, four variables such as current age, attitude of the family members, duration of marriage and husband-wife communication appeared to be important predictors of contraceptive use. The other variables appeared to be statistically insignificant ($p>0.05$).

From the results of logistic regression analysis, it appears that respondent's current age is the most significant factor affecting the current use of contraceptive. Contraceptive use rate increased with the increase of age of the respondents. This has also been revealed in bi-variate analysis. The odds ratio indicates that contraceptive users are 2.4 times higher among the older adolescents (15-19 years) compared to younger adolescents ($p<0.001$). A similar trend of contraceptive use was observed by Islam *et al.,* (1995) among the adolescents. Thus, low use rate of contraceptive among the currently married women in Bangladesh is partly due to universal low age at marriage and this also partly explains why fertility rate is still so high in Bangladesh. As it is expected, level of education has shown a strong positive relationship with the current use of contraceptive. With the increase of level of education, the current use rate of contraception also increases. For instance, it is 37.0 per cent among the illiterates whereas it increased to 45.3 per cent among the adolescents having 6 years and

above education, islam (1997) and Islam *et al.,* (1995) reported similar relationship of contraceptive use with education of the respondents. In this study, pattern of contraceptive use among adolescents was found to increase with level of education of the husbands. Though bi-variate analysis showed a statistically significant positive association of contraceptive use with level of education, logistic

TABLE 4
CORRELATES OF CURRENT CONTRACEPTIVE USE
(MULTIVARIATE ANALYSIS

Attributes	P	p value	Odd s ratio	95% CI
Age in years				
10-14 (RC)	-	-	-	-
15-19	0.8612	0.0003	2.3659	1.4849-3.7698
Years of schooling (Res)				
0(RC)	-	-	-	-
1-5	0.1934	0.1456	1.2133	0.9351-1.5744
>6	0.2328	0.2074	1.2622	0.8788-1.8127
Years of schooling (H)				
0(RC)	-	-	-	-
1-5	-0.1009	0.4722	0.9040	0.6840-1.1948
>6	-0.0037	0.9843	0.9963	0.6856-1.4477
Education (M)				
Illiterate (RC)	-	-	-	-
Literate	0.0728	0.5636	1.0755	0.8402-1.3766
Attitude towards FP				
No(RC)	-	-	-	-
Yes	0.4557	0.0001	1.5774	1.2564-1.9803
Duration of marriage (yrs)				
<3 (RC)	-	-	-	
>3	0.3126	0.0089	1.3669	1.0817-1.7274
Husband-Wife communication				
No (RC)	-	-	-	-
Yes	I 0.4349	0.0000	1.5448	1.2550-1.9016
No. of children				
0(RC)	-	-	-	-
1	-0.0988	0.4100	0.9059	0.7161-1.1460
>2	-0.0300	08713-	0.9704	0 6750-1.3951
Model chi square	79.712			
dt	11			
Significance	0.0001			
N	1881			
Constant	-2.0217			

RC- Reference category

Variables like residence, religion, father's education, work status, type of family, family size and monthly family income which are not statistically significant in bi-vanate analysis are not included in the regression model

regression model, showed no statistically significant association (p>.0.05): This might be due to the fact that in most of the cases the contraceptive decision was taken by elder members of the household or by the husband and the opinions of the adolescents were neglected. It is also true for adult and educated women with delayed marriage relationship.

Among other variables having supportive attitude of the family members towards use of contraceptive method is one of them. Analysis revealed that the contraceptive use rate was 1.6 times higher among the adolescents whose family's elder members are supportive for contraceptive use. This is important for programme implications. The contraceptive use rate was 1.4 times higher among the adolescents with marital duration three years and more. Discussion about family planning with husband is important because it is instrumental in the decision to regulate fertility and hence the use of contraception. A positive association was found in terms of contraception with husband-wife communication for family planning acceptance. The adolescents who have conversation with their husband about family planning method, the current contraceptive use rate was 1.5 times higher among them.

DISCUSSION

Contraceptive use is one of the crucial factors mediating between sexual activities and pregnancy rates among the adolescents as well as their older counterparts. Studies in both developed and developing countries demonstrate that the behavioural patterns of contraceptive acceptance and use differ significantly between adolescents and adult women. This difference may be attributed to maturity, higher knowledge, access to services and experiences among the adults than among the adolescents. Different external influences at the social and policy level affect adolescent contraceptive behavior, factors which vary at the individual level are also important, In the context of developing countries, where contraceptive use among the women of all ages is low and is used largely for limiting child bearing rather than for child spacing, the contraceptive use appears to be minimal among young newly married women. In Bangladesh, only 15 per cent of the ever married women under the age of 20 use contraceptive methods while it is 26 per cent for the age group of 20-24 years and a peak of nearly 42 per cent for those who are aged 35-39 years[5]. The adolescent's use increased slightly to about 19 per cent in 1991 and increased further to 32.9 per cent in 1997 in the age group of 15-19 years and 15.6 percent

in the age group of 10-14 years and 38 per cent in age group of 15-19 years? The present study found a slight higher contraceptive prevalence rate (41%) among, adolescents than previous studies. Though the trend of contraceptive use is increasing but it is far below the expected level. The low performance of contraceptive use among the adolescents in Bangladesh maybe attributed to the insufficient knowledge about sexuality and reproduction.

Knowledge on contraceptive methods refers to whether a respondent had heard of or knows of a family planning method or methods. Contraceptive knowledge awareness logically precedes contraceptive use and it is, therefore, important to know if women-have proper knowledge of contraception or of specific contraceptive methods. In the present study, a series of questions were asked to assess the adolescent; contraceptive awareness as well as their specific time of use. Cent per cent of the respondents ever heard the name of contraceptive 'oral pill', followed by condom (85:3%) and injectables (72.7%). It was also noted that adolescents most preferred to use oral pill (59.6%) than any other method. But' knowledge on timing of contraceptive use was not spontaneous which varies from 15 per cent to 86 per cent in different methods. It is important to know the exact time of use, which is very much pertinent for the prevention of contraceptive failure.

The current contraceptive use .is higher among the study adolescents (41%) than what it was found in the previous studies. Among the users dropout or discontinuation is also high. So, intervention is needed to continue[1] their contraceptive use and thus decrease their contraceptive failure rate. In developing countries, family planning programmes are oriented toward reaching older couples with children wishing to space or avoid birth. In our socio-cultural environment, elder members are riot at all oriented to give advice-to younger couples to use contraceptives. Usual belief is that if the couple starts contraceptive use earlier subsequently she becomes infertile. So, in most of the cases contraceptive use decision comes either from husband or from elder members of the family. But the trend is gradually changing; both husband and wife now take part in contraceptive decision-making process. The present study revealed that older adolescents had positive outlook on contraceptive decision-making process. Past studies opined that female education emerged as an important variable affecting the contraceptive use. Education also contributes to delaying marriage, which also has direct effects on fertility, by postponing a woman's childbearing career. Postponing marriage would be one way to curb the norm of early motherhood. Though bi-variate analysis shows a positive attitude towards contraceptive practice, but in

logistic regression no statistically significant relation was found. This might be due to the fact that adolescents are entering early in marital life and are in conflicting situation having little role in contraceptive use. In many of the cases, contraceptive decisions were made by elder members or after passing a certain period of marital life. In most of the cases, adolescents use contraceptives after having one or more children and after fulfilling the desired family size.

Sources of family planning methods plays an important role in the promotion and maintenance of contraceptive use levels in the population. Private sources remained the largest sources of family planning methods followed by government static facilities such as family welfare centres or hospitals. Only one-fifth received from field workers. The proportion of users who buy their methods from pharmacies and shops rose to 19 per cent in 1996-97 from 15 per cent in 1993-94. But the present study showed a different picture in which the government sources remained very low. The source a woman uses to obtain contraceptive methods is related to the type of method she is using such as IUD is received from static health care facilities, whereas oral pill or condom can also be received from' private sources.

Husband-wife communication about family planning and agreement to use-contraception is necessary for adoption of certain methods; its absence may be a serious impediment for use. Inter-spousal, communication is, therefore, an important intermediate step along with the path to eventual adoption and sustain. In the present study, it was revealed that contraceptive use rate was higher among, the couples who are conversant with the benefit of family planning methods.

The findings may have important implications in Bangladesh family planning programme. Although the family planning has focused on married women of reproductive age, services for married women aged less than 20 years and newlywed have not been emphasized. To meet the family planning and other reproductive health needs of young women, field workers need to make greater efforts to extend their services to relatively, younger and childless couples. Behavior change communication (BCC) efforts be geared up to ensure that young husband-wife participation in family planning and other reproductive health; services. Another important aspect such as action to be undertaken for the development of supportive structure at the community and also at the family level for increasing the educational attainment of females which would help discourage the pattern of early marriage and childbearing.

Acknowledgement

The authors acknowledge the financial help rendered by the Social Science Research Council (SSRC), Ministry of Planning, Government of Bangladesh, for undertaking this study.

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किशोरावस्था विशेषतया विवाहित किशोरवय स्त्रियों के लिए एक नाजुक समय होता है, चूंकि उन्हें शीघ्र ही विवाहित जीवन में प्रवेश करना पड़ता है, जिसके कारण उन्हें शिशु जन्म के परिणाम सहन करने पड़ जाते हैं। यद्यपि किशोरों को गर्भनिरोधकों के बारे में ज्ञान होता है, किन्तु उनके द्वारा गर्भनिरोधक कम प्रयोग किए जाते हैं। 1,881 विवाहित किशोर कम से कम एक गर्भनिरोधक विधि के बारे में परिचित हैं। किन्तु वर्तमान प्रयोग दर बहुत कम है। बहु–परिवर्ती आनुपातिक परावर्तन विश्लेषण से यह पता चला है कि वर्तमान आयु गर्भनिरोधकों के प्रयोग के प्रति पारिवारिक सदस्यों का दृष्टिकोण, वैवाहिक अवधि तथा पति–पत्नी के मध्य वार्तालाप गर्भनिरोधक प्रयोग संबंधी महत्वपूर्ण अग्रनिर्देशक प्रतीत होते हैं। किशोरों की परिवार नियोजन तथा अन्य प्रजनन स्वास्थ्य संबंधी आवश्यकताओं को पूरा करने के लिए क्षेत्र कार्यकर्ताओं द्वारा संबंधित युवा एवं निस्संतान दम्पत्तियों को अपनी सेवायें प्रदान करने के लिए और अधिक प्रयास करने की आवश्यकता है। समुदाय तथा पारिवारिक स्तर पर भी समर्थनकारी ढांचे को विकसित करने के लिए एक अन्य महत्वपूर्ण कार्य महिलाओं की शिक्षा प्राप्ति में वृद्धि करना है, जिससे शीघ्र विवाह तथा शिशु जन्म की प्रवृत्ति कम करने में सहायता मिल सकेगी।

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Health and Population-
Perspectives and Issues 28 (4): 178-188, 2005

KNOWLEDGE ABOUT HIV/AIDS AMONG SENIOR SECONDARY SCHOOL STUDENTS IN JAMNAGAR, GUJARAT

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ABSTRACT

A number of knowledge, attitude, behavior and practice (KABP) studies conducted in different parts of India reveal a widespread ignorance and misconceptions about the disease among adolescents. Hence, this study was undertaken to assess the extent of knowledge, beliefs and attitudes of adolescent students towards HIV/AIDS in two senior secondary schools of Jamnagar, Gujarat The findings of Jamnagar revealed that (i) all the students under study had heard of the disease; (ii) though the sample subjects included both the biology and non-biology stream students but no major difference was found in-the knowledge level regarding mode of transmission of HIV/AIDS between the two groups; (iii) most of the subjects had misconceptions about the pandemic; and (iv) books were on the top of the list followed by TV and newspapers as leading sources of information regarding HIV/AIDS for the students.

The authors suggest that a specific chapter on HIV/AIDS should be included in the school curriculum which could make them aware of the problems of HIV/AIDS epidemic.

Keywords: HIV/AIDS pandemic, Adolescent, Information sources and High-risk behaviour.

AIDS is a pandemic disease without borders. The latest figures compiled by the National AIDS Control Organisation (NACO) show that an estimated 5.21 million adults are living with HIV in India as compared to 5.13 million in 2004. Adolescent age group is an important segment of population and potential resource for prevention of HIV/AIDS transmission. Today, around 25 per cent of .the world's AIDS cases are in their twenties and it is assumed that these people .might have been infected with HIV/AIDS during their adolescent period. Adolescent stage is generally inquisitive. During this period, a boy or a girl wants

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to be independent, very often starts experimenting with-intravenous drugs or sex, both making them vulnerable to contracting HIV/AIDS. Our AIDS prevention and control efforts remain largely concentrated on those who are already practicing high-risk behavior like the commercial sex workers, intravenous drug users, long route drivers, etc. Since prevention is the only key to the control of HIV/AIDS, empowerment of youth with sufficient knowledge about it is important. A number of knowledge, attitude, behavior and practice (KABP) studies conducted in different parts of India reveal a widespread ignorance and misconceptions about the disease among adolescents. Hence, this study was undertaken to assess the extent of knowledge, beliefs and attitudes of adolescent students towards HIV/AIDS in two senior secondary schools of Jamnagar, Gujarat.

MATERIALS AND METHOD

The present study was conducted during January-February 2002 in two randomly selected co-educational schools of Jamnagar, Gujarat, The two schools were selected by random sampling technique. XIIth standard students from both biology and non-biology sections were taken as sample subjects for the study. A total of 358 students in the age bracket of 16-18 years were included in the study of which 155 were from biology and 203 were from non-biology stream. A pre-tested close-ended schedule was administered to each of the samples in their respective classrooms. The entire schedule was explained to the sample students and all the queries raised by them were clarified. Care was- taken to minimize consultation amongst the school children. It was subsequently followed by a open discussion on HIV/AIDS with the students. During discussion, misconceptions and apprehensions regarding HIV/AIDS were clarified. Data were analysed using EPI INFO 2000.

FINDINGS AND DISCUSSION

Knowledge regarding HIV/AIDS

Out of the total of 358 students studied, 155 (43.2%) of them were from the biology stream and 203 (56.8%) were from non-biology stream; 227 were males and 131 were females (Table 1**).** From the findings in Table 2, it is noticed that all the students had already heard of AIDS and a large majority (96%) of them knew that AIDS prevails in India. But a lower proportion of non-biology students (82.7%) had known the correct abbreviation of HIV/AIDS in comparison to the biology-stream students (94.2%). Similarly, a higher proportion of biology students were aware of the fact that HIV is caused by a virus and a fatal disease for which no yaccine is available for its cure. In the present study, 90.5 per cent of the subjects knew that HIV/AIDS is caused by an infective agent while in another study by Basir Gaash et al, only 48.44 per cent of the respondents knew

about this. Out of the total of 358 students, 76 (21.2%) of them had the misconception that AIDS can be cured.

Though significantly a higher proportion of biology students were aware of the fact that AIDS cannot be transmitted through casual contacts like kissing, hugging, shaking hands and sharing utensils but many of them from both the streams had some misconceptions about the disease. Similar misconceptions have also been reported by other studies. So, awareness campaigns to spread the information on HIV/AIDS may be designed to educate the adolescents about the non-availability of effective vaccine to cure HIV/AIDS. The misconceptions regarding the causes and modes of transmission of HIV/AIDS among adolescents need to be uprooted from their minds. Also, the high risk behavior practiced by them should be discouraged. Interestingly, irrespective of their subject streams they belonged to, majority of the students had the correct knowledge regarding other modes of transmission (Table 3). 97.41 per cent of the biology-stream students knew that it transmits through infected needle while it was 96 per cent for non-biology stream.students. Similarly, 80.7 per cent of the non-biology students had known that HIV/AIDS is transmitted through intra-venous drug use (IVDU) while the figure was 88.38 per cent for the biology stream students.

TABLE 1

DISTRIBUTION OF SUBJECTS

Subjects	Male	Female	Total	%
Biology	112	43	155	43.2
Non-biology	115	88	203	56.8
TOTAL	227	131	358	100

The findings revealed that 88.8 per cent of the students had heard of condoms. Biology-stream students were significantly had more knowledge about screening of blood donors (85.8%) and sex with single partner (78.6%) as preventive measures of HIV/AIDS contamination in comparison to non-biology students, 71.4 per cent and 67.4 per cent respectively. The knowledge regarding other aspects of preventive measures like the use of sterilized needles, sexual abstinence, health education and proper use of condoms was equally seen between both the groups (Table 4). No major difference was observed in between both the stream of students regarding the knowledge of high-risk groups. A significantly higher proportion of biology students (80.64%) considered drug abusers as a high-risk group (Table 5). Interestingly, 87.09 per cent of the biology students and 88.1 per cent of non-biology students stated that sex-education could be a preventive measure for HIV/AIDS (Table 4). With regard to the major sources of information on HIV/AIDS, data presented in Table 6 reveal that the students got the information from books (81.8%) followed by TV (78.2%), newspapers (58.6%) and the health personnel (33.2%). Only 29.6 per cent of the adolescents mentioned radio as a source of information for HIV/AIDS. More discussion and interaction by school-teachers and health persons with the students can sensitize them more to read about HIV/AIDS and improve their knowledge level on the disease.

TABLE 2

KNOWLEDGE OF STUDENTS REGARDING GENERAL ASPECTS OF HIV/AIDS

Information	Biology (n-155)			Non- biology (n-203)			Total (n-358)			Z	P
	Y	N	DK	Y	N	DK	Y	N	DK		
Heard of AIDS	155 (100)	0	0	203 (100)	0	0	358 (100)	0	0		
Expansion of AIDS	146 (94.2)	9 (5-8)	0	168 (82.7)	35 (17.3)	0	314 (87.7)	44 (2.3)	0	3.54	<0.01
Abbreviation of HIV	136 (87.75)	19 (12.25)	0	81 (39.9)	122 (61.1)	0	217 (60.6)	141 (39.4)	0	11.05	<0.01
Causative org i) Virus	154 (99.35)	0	1 (0.65%)	170 (83.7)	0	30 (14.7)	324 (90.5)	0	31 (8.6)	5.86	<0.01
Causative org ii) Bacteria	0	0	0	3 (1.4)	0	0	3 (0.83)	0	0		
Prevails in India	150 (96.78)	2 (1.29)	3 (1.93)	194 (95.56)	9	0	344 (96)	11 (3)	13 (1)	0.06	>0.05
AIDS is Fatal	143 (92.25)	10 (6.45)	2. (1.29)	159 (4.5)	36 (17.7)	8 (3.19)	302 (84.3)	46 (12.8)	10 (2.7)	3.87	<0.01
AIDS is Curable	36 (23.22)	112 (72.25)	7 (4.51)	40 (19.7)	157 (77-3)	6 (2.9)	76 (21.2)	269 (75.1)	13 (3.6)	1.08	>0.05
Anti-AIDS Vaccine	7 (4.51)	139 (89.67)	9 (5.8)	50 (24.6)	131 (64.5)	22 (10,8)	57 (15.9)	270 (75.4)	31 (8.6)	6.06	<0.01

(Figures in the parenthesis indicate percentage) (Y-Yes, N-No, DK-Don’t Know)

TABLE 3

KNOWLEDGE OF STUDENTS REGARDING MODE OF TRANSMISSION

Mode	Biology (n=155)			Non-biology (n=203)			Total (358)			Z	P
	Y	N	DK	Y	N	DK	Y	N	DK		
Casual Contact i) Kissing	13 (8.38)	142 (91.6)	0	54 (26.6)	149 (73.4)	0	67 (18.7)	291 (81.2)	0	4.7	<0.01
ii) Hugging	4 (2.58)	151 (97.4)	0	39 (19.2)	164 (80.7)	0	43 (12)	315 (87.9)	0	5.49	<0.01
iii) Handshake	4 (2.58)	151 (97.4)	.0	29 (14.2)	174 (85.7)	0	33 (9.2)	325 (90.8)	0	4.23	<0.01
Sharing utensils	8 (5.16)	145 (93.94)	2 (1.29)	61 (30.2)	127 (62.5)	15 (7.3)	69 (19.2)	272 (75.9)	17 (4.7)	8.06	<0.01
Sex with multiple partners	143 (92.25)	9 (5.82)	3 (1.93)	182 (89.6)	11 (5.4)	10 (4.8)	325 (90.7)	20 (5.5)	13 (3.6)	0.88	>0.05
Infected needle	151 (97.41)	3 (1.93)	1 (0.64)	195 (96)	6 (2.9)	2 (0.98)	346 (96.6)	8 (2.5)	4 (0.8)	0.75	>0.05
Blood and blood product	152	2	1	194	6	3	346	8	4	1.4	>0.05
From infected mother to child	147 (94.8)	5	3 (1.93)	.187 (92.1)	11 (5.4)	5 (2.4)	334 (93.2)	16 (4.4)	8 (2.2)	1.04	>0.05
IV drug use	137 (88.38)		6 (3.87)	164 (80.7)	19 (9.3)	20 (9.8)	301 (84)	31 (8.6)	26 (7.2)	2.07	<0.05
Drinking from same glass	16 (10.32)		4 (2.58)	55 (27)	125 (61.5)	23 (11.3)	71 (19.8)	260 (72.6)	27 (7.5)	1.35	>0.05

(Figures in the parenthesis indicate percentage) (Y-Yes, N-No, DK-Don't Know)

TABLE 4

KNOWLEDGE OF STUDENTS REGARDING PREVENTIVE MEASURES FOR HIV/AIDS

Preventive Measures	Biology (n=155)			Non- biology (n=203)				Total (358)		Z	P
	Y	N	DK	Y	N	D	Y	N	DK		
Heard of condom	142 (91.61)	7	6 (3-8)	176 (86.6)	13 (6-4)	14 (6.8)	318 (88.8)	20 (5.5)	20 (5.5)	1.52	>0.05
Proper use of condom	137 (88.38)	12 (7.74)	6 (3.87)	172 (84.7)	18 (8.8)	13 (6.4)	309 (86.3)	30 (8.3)	19 (5.3)	1	>0.05
Screening of blood donors	133 (85.8)	13 (8.38)	9 (58)	145 (71.4)	24 (11.8)	34 (16.7)	278 (77.6)	37 (10.3)	43 (12)	3.4	<0.01
Sex with single partner	121 (78.6)	23 (14.8)	1 (0.64)	137 (67.4)	43 (21.1)	23 (11.3)	258 (72)	66 (18.4)	24 (6.7)	2.6	>0 01
Sterilized needle	133 (85.8)	16 (10.32)	6 (3.87)	162 (79.8)	23 (11.3)	18 (8-8)	295 (82.4)	39 (10.8)	24 (6.7)	1.51	>0.05
Health education	125 (87.09)	14 (9.03)	6 (3.87)	179 (88.1)	17 (8.3)	7 (3.4)	314 (87,7)	31 (8.6)	13 (3-6)	0.2	>0.05
Sexual abstinence	66 (42.5)	81 (52.25)	8 (6.45)	86 (42.3)	41 (20.1)	76 (37.2)	152 (42.4)	122 (34)	84 (23.4)	0.96	>0.05a

(Figures in the parenthesis indicate percentage) (Y-Yes, N-No, DK-Don't Know)

TABLE 5

KNOWLEDGE OF STUNDENTS REGARDING HIGH RISK GROUPS

High Risk Groups	Biology (n=155)			Non- biology (n=203)			Total (358)			Z	P
	Y	N	DK	Y	N	DK	Y	N	DK		
i) IV drug users	125 (80.64)	13 (8.38)	17 (10.96)	126 (62)	47 (23.1)	30 (14.7)	251 (70.1)	60 (16.7)	47 (13.1)	4.05	<0.01
ii) Prostitutes	143 (92.25)	1 (0.64)	11 (7.9)	177 (87.1)	10 (4.9)	16 (7.8)	320 (89.3)	11 (0,3)	27 (7.5)	1.6	>0.05
iii) Recipient of : multiple blood transfusion	130 (83.87)	13 (8.38)	12 (7.74)	161 (79.3).	16 (7.8)	26 (12.8)	291 (81.2)	29 (8.1)	38 (10.6)	1.1	>0 05
iv) Homosexuals	79 (50.96)	42 (27,09)	34 (21.93)	93 (45.8)	54 (26.6)	56 (27.5)	172 (48)	96 (26.8)	90 (25.1)	0.97	>0.05
v) Drivers	40 (25.81	78 (50\3)	37 (23.87)	66 (32.5)	91 (44.8)	46 (22.6)	106 (29.6)	169 (47.2)	83 (23.1)	0.28	
Non-high risk groups											
i) Persons looking after AIDS patients	21 (13.54)	104 (67.09)	30 (19.35)	89 (43.8)	73 (35.9)	41 (20.1)	110 (30.7)	177 (49.4).	71 (19.8)	6.17	<0.01
ii) Frequent blood donors	52 (33.54)	66 (42.5)	37 (23.87)	85 (41.8)	76 (37.4)	42 (20.6)	137 (38.2)	142 (39.6)	79 (22)	0.09	>0.05

(Figures in the parenthesis indicate percentage) (Y-Yes, N-No, DK-Don't Know)

TABLE 6
SOURCES OF INFORMATION FOR STUDENTS ABOUT AIDS

Sources	Biology (n=155)		Non-biology (n-203)		Total (358)
Books	131	(84.51)	162	(79.8)	293 (81.8)
TV	129	(83.22)	151	(74.3)	280 (78.2)
Newspaper	111	(71-6)	99	(48.7)	210 (58.6)
Teachers	96	(61.9)	77	(37.9)	173 (48.3)
Health Personnel	68	(43.87)	51	(25.1)	119 (33.2)
Radio	67	(43.22)	39	(19.2)	106 (29.6)
Friends	76	(49.03)	00	(00)	76 (21.1)
Pamphlets	66-	(42.5)	36	(17.7)	102 (28.4)

(Figures in the parentheses indicate percentage)

Adolescents form a sizeable proportion of the population. As per the National Family Health Survey (NFHS-2) 1998-'99, approximately 22 per cent of India's population was adolescents in the age group of 15-19 years. In 1992, the World Health Organization (WHO) recommended the young children and adolescents as a potential resource for spreading messages on HIV/AtDS for its prevention. Therefore, a subject on HIV/AIDS in school education was introduced all over the globe. Already one decade has passed and a dramatic progress has been made in teenage education in many countries like Thialand and Sri Lanka. While in India, progress in this regard is slow. A recent Indian study applying the Libert and Murphy Technique Scale of Assessment for measuring the performance scores of adolescents aged 19 years or less, revealed that: most of them fared an average 'poor' or at best a 'fair' score which was statistically much lower in the case of female adolescents in relation to HIV/AIDS. Our AIDS prevention and- control efforts remain largely concentrated on those who are already practicing high-risk behaviour like the commercial sex workers, intravenous drug users, long-route drivers, etc. The currentstudy was conducted solely upon urban students residing and studying in Jamnagar who are supposed to be better informed than their rural counterparts.

CONCLUSION

It was observed, that though the general level of "knowledge of senior secondary school students about HIV/AIDS was not so poor but they had a number of misconceptions about it. It is also becoming clear that the students have no reliable means of obtaining correct information on the subject

of HIV/AIDS which led them to develop misconceptions. Besides, the school authorities and the other concerned should come forward to design awareness campaigns for the benefit of the students so as to help them develop proper understanding of what HIV/AIDS is, how does it spread? and how to prevent it? So, the authors recommend the inclusion of a specific chapter on HIV/AIDS in the school curricula which could help in preventing and curbing the spread of the. epidemic to a great extent.

Lkkjk'k

भारत के विभिन्न भागों में ज्ञान, दृष्टिकोण, व्यवहार एवं अभ्यास संबंधी संचालित अनेक अध्ययनों से किशोरों में रोग के विषय में फैली व्यापक अनभिज्ञता तथा गलत अवधारणाओं के बारे में पता चला है। इसलिए यह अध्ययन जामनगर, गुजरात के दो सीनियर सेकेण्ड्री स्कूलों में एचआईवी/एड्स के प्रति किशोर छात्रों के ज्ञान, विश्वास तथा दृष्टिकोण की सीमा का आंकलन करने के लिए संचालित किया गया था। जामनगर में प्राप्त निष्कर्षों से यह पता चला है कि (I) अध्ययन के अर्न्तगत छात्रों ने उक्त रोग के बारे में सुना था, (II) यद्यपि सैम्पल में लिए गए छात्रों में जीव विज्ञान तथा गैर जीव–विज्ञान विशय वाले छात्र शामिल थे, किन्तु दोनों वर्गों के बीच एचआईवी/एड्स रवे संचरण–माध्यम के बारे में ज्ञान में कोई बड़ा अन्तर नहीं पाया गया था, (III) अधिकांश छात्रों में इस सर्वलौकिक महामारी के बारे में गलत अवधारणायें विद्यमान थीं, तथा (IV) छात्रों के लिए एचआईवी/एड्स के बारे में सूचनायें प्रदान करने के प्रमुख साधन के रूप में टी.वी. तथा समाचार पत्र के पश्चात पुस्तकें तथा उनकी सूची में सर्वोच्च साधन थीं।

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Health and Population-
Perspectives and Issues 28 (4): 189-196, 2005

FACTORS AFFECTING BIRTH WEIGHT IN A SUB-URBAN COMMUNITY: A STUDY IN A SECONDARY LEVEL HOSPITAL IN DELHI

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ABSTRACT

The study was conducted to assess the impact of various factors like maternal age, parity, gestational age, ante-natal care and anaemia on birth weight. Twenty seven per cent of the new-borns were found to have a low birth weight. Low birth .weight babies were born more to the mothers with age below 20 years (30.8%)\as compared, to.women more than 20.years of age (25.3%). Neonates with a gestation penod of less than 37 weeks were more prone to low birth weight The subjects who were not availing of ANC services had more number of low birth weight babies as compared to those who received ANC services (29.3% and.25.5% respectively). Female babies were more prone to low birth weight as compared to the male babies. The adjusted odds ratios were 1.36 for maternal age less than 20 years, 1.58. for period of gestation, (POG) less than 37 weeks, 1.23 for non-utilizers of ANC and 1:32 for female babies. The authors suggest that marriage beyond 18 years of age for the girls and increase the coverage of ANC to cent per cent for pregnant women may be promoted.

Keywords: Birth weight, Maternal age, Ante-natal care, Marriage and Period of gestation.

Birth weight is the single most important factor determining the survival chances of the new-born. Many of the new-borns die during their first years of life. The infant mortality rate is about 20 times higher for all low birth weight babies than other babies[1]. The lower the birth weight, the lower is the survival chance of the new-born. Many of the low birth weight new-borns become the victims of protein energy malnutrition (PEM) and infection.

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According to the international agreement, low birth weight has been defined as "birth weight of less than 2,500 grams (2-1/2kg)." The birth weight of the infant is preferably measured within the first hour of its birth and before the postnatal weight loss is significantly occurred[2].

Low birth weight is one of the most serious challenges for mother and child health (MCH) in developing countries. It has a number of public health consequences such as mental retardation, high-risk -of peri-natal and infant mortality as well as morbidity and the very high cost of special care and intensive care unit (ICU). It has been revealed that half of all peri-natal and one-third of all infant deaths occur due to low birth weight[3].

The infant mortality rate (IMR- rate of mortality cases per thousand live-births) in India was 67.6 in the year 93-98 as estimated by NFHS-2. It varies from 86.7 in Uttar Pradesh to 16.3 in Kerala. According to NFHS-2, the infant mortality rate was higher among children born to mothers below 20 years than children born to mothers of 20-29 years of age. As per the findings of NFHS-2, infant mortality rate was 93 in case of mothersbelow 20 years as compared to 63 in the case of mothers above 20 years of age. The IMR was more in the case of first child (74.9) in comparison to the third child (61.7). IMR increases as the size of baby decreases. Thus, there was an extra contribution of about 10-15 deaths per thousand births (in IMR) by low birth weight babies.

22.7 per cent of babies-bom each year are LBW as estimated of by the World Summit (98-99). The incidence of low birth weight is still high in India. Prevention of Low Birth Weight would help in the reduction of high infant morbidity and mortality. It has been observed in some studies that" low birth[1] weight is influenced by certain factors like period of gestation ante-natal care maternal age, parity, anaemia, etc. 42 per cent of the new-boms had low birth weight and 90 per cent of the neonate deaths had occurred in the low birth weight babies, a study in a tribal area revealed.

OBJECTIVE

This current study was conducted with an objective of assessing the .impact of various factors like maternal.age, parity, gestational age, ante-natal care, anaemia, etc. on the birth weight of the infant. This relationship might offer some ways and means forjnitiating public health measures which may help in increasing the birth weight of the newborns and reducing their morbidity and mortality.

METHODOLOGY

This is a hospital-based study conducted at a secondary level hospital of CRHS Project, Ballabgarh, a rural field practice area of Center for Community Medicine (CCM), All India Institute of Medical Sciences, New Delhi. This is a sub-district hospital catering the services to about one lakh population where around 1300 to 1500 deliveries take place in a year. The details of all the in-patiehts were encoded in a computerized medical record system using Dbase IV. There were 2,903 deliveries in this sub-district hospital from January 2000 to December 2001. From the 2,903 deliveries, 2,807 singletons were included in the study for analysis while the sixty-two twin and other cases with missing data were excluded from the study. Information was derived from the case-sheet of mother and new-bom record. Appropriate analysis was carried out using Epi lnfo-2000 and STATA packages. Fifty-one (51) females were not able to recall their date of last menstruation period (LMP), so they were excluded from analysis during multivariate analysis. The weights of the new-boms were measured on a digital weighing scale soon after the birth without clothes. The precision of the machine was up to one gram with a capacity to measure a minimum weight of 40 grams and a maximum weight of 10 Kgs. A baby with a weight of less than 2.500 kg was defined, as low birth weight. The mother's age was coded as filled in the case sheet and the cut-off date of 20 years was selected for the study. The dividing point for'the period for gestation was 37 weeks. The criterion for anaemia was taken as per the findings of the clinical examination at the time of delivery.

FINDINGS

Out of the 2,807 new-boms included in the study, 1,513 (54%) were males and 1,294 (46%) were females. The mean weight of the new-boms was 2.68kg. 745 new-boms (26.5%) were, haying, a birth weight of less than 2,500gms ($2^1/2$kg). It was seen that 22.7 per cent of the mothers were below the age of 20 years. About 39 per cent of the women were bearing child for the first time. Out of the 2,807 mothers, 2,049 (73%) had received at least one round of ante-natal care during their pregnancy. 35 per cent of the women were found to be anaemic at the time of their delivery. The period of gestation was not ascertained in 51 women. Hence, out of the 2,757 mothers, only 14 per cent of them had delivered their baby in less than 37 weeks of intrauterine life.

The findings of the study show that low birth weight babies were more common to mothers with an' age of less than 20 years (30.8%) as compared to mothers above 20 years of age (25.3%). The unadjusted odd ratio (OR) for age was 1.32 (35% CI, 1.08-1.61) and adjusted OR was-1.36 (95% CI, 1.11 - 56). The period of gestation (POG) also showed an impact on birth weight as.34.7 percent of the

mothers had low birth weight babies with a POG of less than 37 weeks in comparison to only 25.3 per cent of mothers delivering LBW babies with complete POG. The unadjusted OR for POG less than 37 weeks was 1.57 (95% CI, 1.24 - 1.99) and adjusted OR was 1.58(95% CI, 1.25 - 1.99). Though the first birth (zero parity) had a higher percentage of Low Birth Weight which was not found to be statistically significant after adjustment.

The non-utilizers (29.3%) of ante-natal care (ANC) had more number of low birth weight babies as compared to those who had received ANC (25.5%). The unadjusted OR for non-utilization of ANC was 1.21 (95% CI, 1.00 -1.46) and adjusted OR 1.23 (95% CI, 1.02 - 1.48). The findings of the study reveal that anaemia was not significantly affecting the birth weight at the time of delivery. Further, the findings show that more number of female babies (29.4%) were more prone to low birth weight as compared to male babies (24.0%). The unadjusted odds ratio for females was 1.32 (95% CI, 1.11 -1.57) and for adjusted OR was 1.32 (95% CI, 1.11 -1.56) (Table .1).

Variable	**Low B.Wt.**		**Normal B.Wt.**		**p . Value**	**Unadjusted (95% CI) OR**	**Adjusted (95% CI) OR**
	(n=745)		**(n=2062)**				
	No.	%	No.	%			
Mother's Age							
(<= 20Yrs	197	30.8	440	69.2	X^2=7.82, p=0.005	1.32 (1.08-1.61) 1	1.36 (1.11-1.56)
(>=21yrs	548	25.3	1622	74.7			
Period of Gestation (POG)*							
<37 weeks	134	34.7	252	65.3	$X^{2=}$15.04, p=0.0001	1.57 (1 24-1.99) 1	1.58 (1.25-1.99)
>37 weeks	600	25.3	1771	74.7			
Parity							
0	317	28.9	781	71.1	X^2=5.23. p=0.07	1.18 (.97-1.40) 1	NS
1-3	409	25.2	1217	74.8			
>3	19	22.9	64	77.1			
Ante-natal Care (ANC)							
Not Taken	222	29.3	536	70.7	X^2=4.02, p=0.045	1.21.(1.00-1.46) 1	1.23(1.02:1.48)
Taken	523	25.5	1526	74.5			
Sex of Baby							
Female	381	29.4	913	70.6	X^2=10.38, p=0 001	1.32 (1.11-1.57) 1	1.32(1.11-1.56)
Male	364	24.0	11.49	76.0			
Anaemia							
Present	255	26.2	717	73.8	X^2=0073, p=0.79	0.97 (0.82 -1.12) 1	NS
Not Present	490	26.7	1345	73.3			

*pog: n=2,756; In 51 cases, POG couldn't be ascertained due to Non-recall of exact date of last ,menstruation period (LMP)

DISCUSSION

Mother's age

The study results establish that the prevalence of low birth weight is significantly associated with the mother's age. More number of mothers below 20 years of age had delivered more LBW babies which was statistically significant (p=0.005). This association still persisted even after controlling other factors-as shown by adjusted odd ratio, Similar findings have also been seen in studies conducted in Banglore[6] and some other places.

In India, 34 per cent of the women in the age group of 15-19 years are married and contribute to 19 per cent of births a year with a variation of 5.9 per cent to 21.4 per cent in Goaand Madhya Pradesh respectively (NFHS-2). The law to prevent marriage of females before the age of 18 years in India has not been found successful. So, it is highly desired that the concerned authorities should take appropriate initiatives to implement the right age of marriage for females in letter and sprit. It must be seen that females should bear child after they are 20 years old. This initiative would help in reducing the high IMR which is high in the case of younger mothers, specifically the mothers below 20 years of age.

Period of Gestation

It was found that the period of gestation (<37 weeks) was statistically associated with LBW (p=0.0001). Similar results were also observed by Felke Y et al at St. Pauls Hospital in Addis Ababa. Ganguli et al showed that mothers delivering heavy weight babies had an average gestation period of one to five weeks longer than the mothers delivering normal weight or LBW babies.

Though there is less scope to improve the- gestational period through public health measures but improvement in other maternal factors like literacy, birth-spacing and reduced smoking level might improve the period of gestation and consequently improve the birth weight of the baby.

Parity

Parity was not statistically associated with birth weight in the present study which is in contrast to the observation made by Felke Y et al and Pinherio et al[6] who found a significant association between birth weight and parity. Parity and age

go together and when controlled for age, parity might have lost its impact independently. NFHS-2 also showed that birth order tends to have U-shaped relationship with death with first births and higher order (4+) having elevated IMR (74.9..61.7, and 101.1 for birth order of 1,3 and 6+respectively)[4].

Ante-natal Care

Non-utilization of ante-natal care during pregnancy was independently and significantly associated with low birth weight ($p<0.05$) which is in agreement with the.findings of Pinherio.A et al[6], Nadiaye 0 et al, Abu-Heija et al and Gortzak-uzan[10]. Only 65 per cent of the mothers, in India received at least one ante-natal check-up during the three years preceding the survey (NFHS-2)[4]. This varied from 99 per cent in Goa to 34.6 per cent in Uttar Pradesh. The awareness to avail of this facility will improve the utilization and decrease the percentage of low birth weight babies and infant mortality. There is a greater need to increase the coverage of ANC for all pregnant women.

Sex of Baby

Female baby was significantly prone to low birth weight ($p=0.001$) and the same was also reported by Felke et al[5]..

Anaemia

Anaemia in mother at the time of delivery was not significantly associated with low birth weight of the baby. In the studied mothers, the prevalence of anaemia was much lower and half (26%) of the national average (52%). The investigators perceive that this may'be due to high coverage of prophylactic iron supplementation in this population.

LIMITATION

Factors like type of food (veg Vs non-veg), location of residence (rural Vs urban) and frequency of ante-natal care may also contribute to low birth weight occurrence. But this being a hospital-based study, focus was given to the factors which might offer opportunity for initiating public health measure.

CONCLUSION

Out of the four factors statistically associated with low birth weight, mother's age and ANC can be considered immediately for public health action, There is a need to promote right age at marriage (minimum 18 years) and increase the coverage of ANC to cent per cent pregnant women. Period of gestation may be improved through different contraceptive methods of spacing. But in the Ballabgarh area, these methods are not popular and mothers prefer sterilization rather than spacing the births. Though anaemia was not found to be associated with LBS in the current study, there is a greater necessity to increase the coverage of ironand folic acid prophylaxis to prevent severe anaemia.

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यह अध्ययन जन्म भार संबंधी विभिन्न घटकों जैसे मातृत्व आयु, अनुरूपता, गर्भधारण करने की आयु, प्रसवपूर्व परिचर्या तथा रक्ताल्पता के प्रभाव का आंकलन करने के लिए संचालित किया गया था। सत्ताइस प्रतिशत नवजात शिशु, अल्प जन्म भार वाले पाए गए थे। 20 वर्ष (25.3%) से अधिक आयु वाली महिलाओं की तुलना में 20 वर्ष (30.8%) से कम आयु की माताओं को अल्प जन्म भार वाले शिशु उत्पन्न हुए थे। 37 सप्ताह से कम गर्भधारण अवधि में उत्पन्न हुए नवजात शिशुओं में अल्प जन्म भार अधिक पाया गया था। प्रसवपूर्व परिचर्या सेवा प्राप्त करने वाली महिलाओं की तुलना में प्रसवपूर्व परिचर्या प्राप्त न करने वाली महिलाओं (क्रमशः 29.3% तथा 25.5%) को अधिक संख्या में अल्प जन्म भार वाले शिशु जन्में थे। समायोजित विषमता अनुपात 20 वर्ष की आयु से कम मातृत्व आयु हेतु 1.36, 37 सप्ताह से कम गर्भकाल हेतु 1.58, प्रसवपूर्व परिचर्या सेवाओं का उपयोग न करने वाली महिलाओं हेतु 1.23 तथा बालिका शिशुओं हेतु 1.32 पाया गया था। लेखकों द्वारा यह सुझाव दिया गया कि बालिकाओं के लिए विवाह की आयु 18 वर्ष के पश्चात होनी चाहिए तथा शत–प्रतिशत गर्भवती महिलाओं के लिए प्रसवपूर्व परिचर्या सेवाओं की कवरेज में वृद्धि की जायें

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Health and Population-
Perspectives and Issues 28 (4): 197-204, 2005

DETERMINANTS OF ACCEPTANCE OF NO-SCALPEL VASECTOMY AMONG MEN ATTENDING THE NSV CLINIC IN A PUBLIC SECTOR HOSPITAL OF DELHI

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ABSTRACT

Though males are the prime decision-makers in reproductive matters, their acceptance of No-Scaplpel Vasectomy (NSV) as a family planning method has not been satisfactory so *far. The study undertaken in the NSV'clinic of Safdarjang Hospital, New Delhi, during the year 2003-2004 found that 89.9 per cent ofthe males had ever used a spacing method. Only 30.3 per cent of the sample subjects' mentioned self-motivation as the reason for spacing the birth out of the men who had opted for a spacing method, it was found that 77.4 per cent of them switched oyer to a permanent method to limit the size of the family^ It was noticed.that out of the total men preferring NSV over, the sterilization of their wives, 70.2 per cent of them stated that it was their own preference to undergo NSV. Another thing observed in the study was that men with a family size of three or more children preferred to be sterilised. Public Health Nurses posted at the NSV clinic and the FP clinic had played a major role in motivating the acceptors. To give an impetus.to the men, No-Scalpel Vasectomy which takes less time to perform and causes less pain; could be popularized among the masses.*

Key words: No-Scalpel Vasectomy, Contraceptive, Children and Sterilisation.

The need for taking greater responsibility by male partners in family life is being increasingly emphasized in the recent years. To enhance male-participation in family planning, a greater basket of choices of effective and safe male contraceptive methods should be made available. No-Scalpel Vasectomy (NSV) is one such methodwhich was developed and performed for the first time in China in 1974 by.Dr Li Shungquiangpfthe Chongqujng Family Planning Scientific

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Research Institute in Schuan Province[1]. NSV takes a much less time and also reported to cause less pain than the conventional method[2]. NSV also allays the fear of incision experienced by vasectomy acceptors. NSV was introduced in India in 1992 and the Government of India accepted it as a part of National Family Welfare Programme.

OBJECTIVES

There are many factors that influence every individual's decision concerning the choice of contraceptive methods. The present study was undertaken:

(i) to find out the determinants of acceptance of NSV as a method of contraception;

(ii) to study the demographic and socio-economic characteristics of the persons undergoing NSV; and

(iii) to study the motivational factors of the acceptors.

MATERIALS AND METHOD

The present study was conducted among all the 124 males who attended the NSV clinic of Safdarjang Hospital, New Delhi, from April 2003 to March 2004. The NSV clinic was started in the year 1994 at the Safdarjang Hospital, a large public sector hospital that caters to the needs of a large number of people of Delhi and neighbouring states. Relevant information was collected and compiled by conducting personal interviews using a semi-structured interview schedule. Socioeconomic classification was done by following the Gupta et al criteria[3].

FINDINGS

Data presented in Table 1 reveal that almost 50 per cent of the NSV acceptors were, in the age group of 36-40 years and most of them were Hindus (95.2%). 46 per cent of the respondents had high school level of education while 23.4 per cent and 13.7 per cent had senior secondary level and post graduate and above respectively. By and large, most of the NSV acceptors were educated and only 1.6 per cent had no education. It can also be seen from Table 1 that out of the 124 men, 21 belonged to the higher income group, 36 middle, 48 upper lower and 19 lower income group. 44.3 per cent of the samples had nuclear family set

ups and the remaining 55.6 per cent had joint families. It was seen that only 4 men were in their 10-15 years of marriage period and 6 had got married more than.25 years back.

TABLE 1

SOCIAL-DEMOGRAPHIC CHARACTERISTICS OF THE NSV ACCEPTORS (N=124)

Socio-demographic Indicators	**Number**	**%**
Age (in years)		
31-35	14	11.2
36-40	61	49.2
41-45	39	31.4
>45	10	8.1
Religion		
Hindu	118	95.2
Muslim	04	3.2
Sikh	02	1.6
Education		
Illiterate	02	1.6
<Primary	05	4
Primary	08	6.4
Middle school	06	4.8
High school	57	46
Senior Secondary	29	23.4
PG and above	17	13.7
Income (per Capita/mo.)*		
H1000-1599	21	16.9
M 500-999	36	29.0
UL 200-499	48	38.7
L <200	19	15.3
Type of family		
Nuclear	55	44.3
Joint	69	55.6
Duration of marriage (yr.) .		
10-15	04	3.2
15-20	20	16.1
20-25	94	75.8
>25	06	4.8

(*Gupta et al)

Table 2 shows that majority of the men (89.9%) had used at least a spacing method. Condom was the most popular method among them (46.8%) followed by intra-uterine contraceptive device (IUCD) (39.4%) and oral contraceptives (11%). Only 2.7 per cent of them had used more than one contraceptive method. It was interesting to find that self-motivation was the highest source for the males (30.3%) for the acceptance of spacing methods followed by motivation by doctor (23.8%), friends (21.1%), relatives (16.5%) and the mass media (8.3%) (Table2).

TABLE 2
CONTRACEPTIVE HISTORY OF NSV ACCEPTORS (N=124)

Ever Use of Contraception	**Number**	**%**
Yes	98	89.9
No	11	10.1
Method Used		
IUCD	43	39.4
OCs	12	11
Condom	51	46.8
>1 method	03	2.7
Source of Motivation		
Self	33	30.3
Doctor	26	23.8
Friend	23	21.1
Relative	18	16.5
Mass media	09	8.3

Out of the 43 respondents whose wives were using' IUCD; 23 of them complained of pain (53.5%), 17 reported to have increasedbleeding (39.5%) and 3 mentioned that it was fallen (7%). From amongst the men whose spouses were using oral contraceptives (12), the problems reported by them were; (i) forgot to take the pill by 4 (33.3%), (ii) weight gain by 2 (16.6%) and (iii) nausea and vomiting by 6 (50%). Condom was the most popular method used for spacing between births. Out of the total men who were using condom, 15 (29.4%) had found it inconvenient to use and 7 (13.7%) stated that it bursts during inter-course.

Limiting the size of the family was cited as the main reason for switching over to a permanent method of contraception by a majority of the respondents (96). Another 23 men informed that they were apprehensive of the performance of

the temporary contraceptive methods and decided to accept NSV. Besides, other problems cited were tired of using the temporary contraceptive method by three respondents and 'side effects' of the contraceptive method by two males as reasons.for accepting the permanent method of sterilization, NSV.

It was observed that the own-wish of the respondents was the main reason for the acceptance of NSV oyer sterilization of their wives (87) followed by doctor's advise (25). Further, Table 3 reflects that of the total 124 NSV acceptors, seven mentioned that they opted for it because of the ill health of their wives; three thought that sterilisation in females is a complicated process and two accepted it since their wives were not willing for sterilisation.

TABLE 3

REASONS FOR ACCEPTANCE OF NSV OVER FEMALE STERILIZATION

Reasons	**Number=124**	**%**
Sterilization more complicated in females	03	2.4
III health of wife	07	5.6
Wife not willing for sterilization	02	1.6
Own wish	87	70.2
Doctor advised	25	20.2

Data presented in Table 4 indicate that the Public Health Nurses (PHNs) at the NSV clinic had played a *vital* role in motivating the males to adopt NSV (42%) followed by the social worker at the NSV clinic (31.4%) and PHNs at the family planning clinic (23.4%). However, doctor's role for motivating the males to adopt NSV was minimum (11.3%).

The study found that 36 men accepted sterilization after achieving a family size of four with two males and two females, 25 underwent NSV after having three children with two males and one female child. 20 respondents accepted NSV after having five children of whom three were males and two females, 17 respondents had five children with two males and three females. Eight of the men had four children with three males and one female and two respondents had only two sons. Itwas found that none of the respondents adopted vasectomy without having at least two male issues.

Most of the men undergoing NSV at the clinic (106) had heard of NSV through mass media and others (18) had come to know through other sources. Though all of them knew that NSV was a permanent method, most of them had

not heard of any other person who had undergone NSV. Largely, because it is a painless operation and considered to be popular over the conventional method.

TABLE 4

SOURCES OF MOTIVATION FOR NSV=124

Source of motivation	**Number**	**%**
PHN (NSV clinic)	42	33.9
PHN(FP clinic)	29	23.4
Doctor (NSV clinic)	14	11.3
Social worker (NSV clinic)	39	31.4

DISCUSSION

Majority of the acceptors belonged to the age group of 36-40 years with the mean age at vasectomy was 38.6 years. This finding is similar to that of Mridha el af[4]. Rajoura, however, observed a lower mean age at vasectomy i.e. 34.8 years. As most of the acceptors were Hindus by religion, it seems that vasectomy is still not a popular method .among Muslims as has also been observed by others. As this study was conducted in Delhi which has a-high female literacy rate, only 6.4 per cent of the spouses were illiterate, and this figure is much lesser than reported by Rajoura[5] (30%) but Sarkar[7] in his work reported that most of the spouses were illiterate. Main reason cited for adoption of vasectomy was the own wish of the acceptors. Condom was the most commonly used spacing method which shows that men are keen to plan their families. However, this finding is not in agreement with the findings of Rajoura. Mostofthe acceptors had heard of NSV for the first time via the mass media as also quoted by others. Majority had a family size of three or more and a preference for the male sex. Gandotra in his work observed the average family size to be 3.97 and average number of male children per family to be 2.25. Mridha et al, Kohli and Jayalakshmi et al also supported these findings.

CONCLUSION

To popularize the acceptance of NSV among men and to involve them to actively participate in family planning, there is a need for rigorous mass media campaign to highlight the advantages of NSV and the places of its availability. The mass media campaigns should highlight the advantages of NSV viz. (i) how it is a painless operation and (ii) benefits of the post-NSV sexual life of the acceptor.

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यद्यपि पुरूष प्रजनन मामलों में प्रमुख निर्णयकर्ता होते हैं, किन्तु एक परिवार नियोजन विधि के रूप में नो–स्कालपल वासक्टमी के संबंध में उनकी स्वीकार्यता अभी तक संतोशजनक नहीं है। वर्ष 2003–04 के दौरान सफदरजंग अस्पताल, नई दिल्ली के एनएसवी क्लिनिक में संचालित अध्ययन से यह पाया गया है कि 89.9 प्रतिशत पुरूषों द्वारा अन्तराल विधियां प्रयोग की गई थी। केवल 30.3 प्रतिशत सैम्पल पुरूषों द्वारा ही बच्चों के जन्म में अन्तर रखने के लिए आत्म–प्रेरणा के बारे में उल्लेख किया गया था। अन्तराल विधि अपनाने वाले पुरूषों में यह पाया गया था कि उनमें से 77 प्रतिशत द्वारा परिवार का आकार सीमित रखने के लिए इसे स्थायी रूप से अपनाया गया था। यह देखा गया था कि नो–स्कालपाल वासक्टमी को वरीयता देने वाले कुल पुरूषों में अधिकांश द्वारा अपनी पत्नी का नसबंदी आपरेशन कराने की बजाय नो स्कालपल वासक्टमी विधि को वरीयता प्रदान की गई थी, उनमें से 70.2 प्रतिशत द्वारा नो स्कालपल वासक्टमी कराने के लिए स्वयं–वरीयता के बारे में उल्लेख किया गया था। इस अध्ययन में एक अन्य बात यह देखी गई थी कि तीन अथवा इससे अधिक बच्चों के परिवार आकार वाले पुरूषों द्वारा नसबन्दी कराने की वरीयता प्रदान की गई थी। नो स्कालपल वासक्टमी क्लिनिक तथा परिवार नियोजन क्लिनिक में तैनात जन–स्वास्थ्य नर्सों द्वारा स्वीकारकर्ताओं को प्रेरित करने में मुख्य भूमिका निभाई गई थी। पुरूषों को प्रेरणा देने के लिए नो–स्कालपल वासक्टमी आपरेशन करने में कम समय लगता है तथा दर्द भी कम होता है, लोगों में अधिक लोकप्रिय हो सकेगा।

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Health and Population-
Perspectives and Issues 28 (4): 205-214, 2005

PERIODATE METHOD FOR THE PREPARATION OF STEROID ENZYME CONJUGATE FOR ENZYME IMMUNOASSAYS

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ABSTRACT

The carboxyl derivatives of steroid are generally conjugated with amine group of enzyme. This is the only reaction mechanism available for coupling carboxyl derivatives of the steroid to amino group of enzymes through - amide bond, formation. Sometimes, it is difficult to couple an enzyme with steroid derivative due to non-availability of amino groups in the enzyme. Here, periodate method for the introduction of amino groups in the enzyme followed by coupling with carboxyl derivative of steroid by carbodiimide mediated N-hydroxysuccinimide has been described, in this new strategy, carbohydrate moieties of enzymes were first oxidized by sodium metaperiodate to generate reactive aldehyde group in enzyme followed by additon of excess amount of adipic acid dihydrazide (ADH), a homobifunctional cross linker to form hydrazone bond through a reaction between aldehyde group of enzyme and hydrazide group of adipic acid dihydrazide. The enzyme adipic acid dihydrazide (enzyme-ADH) complex is utilized for preparing steroid-enzyme conjugate through diimide bond formation.

Keywords: Conjugation, ELISA, Periodate, Enzyme, Cortisol and Horseradish peroxide.

In enzyme immunoassay, conjugation of enzyme with the immuno-reactants is the basic requirement. Enzyme, being protein, is primarily composed of polymerized amino-acids and posseses several reactive functional groups, primarily provided by those amino-acids that have ionizabte side-chains. The reactivity of functional groups are largely determined by the sequence location and their interactions with the side-chains of neighbouring amino-acids in the overall three-dimensional structure of the enzyme molecule. Generally, only those reactive groups which are located on the surface of protein/enzyme and thus,

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exposed to aqueous environment are available for chemical modification and conjugation purposes. In proteins/enzyme, there are essentially eight hydrophilic side-chains that are chemically active[1-2]. These side-chains and their functional groups are: (i) amino group of N-terminal amino-acid and free amino group of lysines, (ii) sulfhydryl group of.cysteine, (iii) thioether group of methionine, (iv) carboxylate group of C-termirial amino-acid and p and y-carboxylate group of aspartic acid and glutamic acid respectively, (v) phenolic group of tyrosine, (vi) imidazolyl group of histadine, (vii) guanidinyl group of arginine and (viii) indolyl group of tryptophan. Of these, first five groups are chemically most reactive. On the other hand, native steroid molecules do not possess any reactive group that can be directly linked with the enzyme. To prepare carboxylate derivative of steroid, commonly hemisuccinate group (at alchoholic or phenolic hydroxy moiety) or O-carboxymethyl oxime group (at aldehyde or ketone moiety of steroid) are introduced. The most commonly used conjugation method involves the formation of amide bond between carboxylate group of steroid derivative and amino group of enzymes But sometime, amino group of N-terminal amino acid and free amino group of lysines of enzyme like horseradish peroxidase (HRP), are not accessible for conjugation. To overcome the above problem, no alternative method is available for the preparation of steroid enzyme conjugate.

Here, we describe an alternative method to conjugate glycoenzyme with the steroid. The principle involves the periodate oxidation of carbohydrate moieties of glycoenzyme to form reactive aldehyde group. To this newly formed aldehyde group, one'amine group of a homo Afunctional reagent like dihydrazide, is coupled by forming hydrazone linkages. In final step other amine group of coupled homo Afunctional reagent is conjugated with carboxylate group of steroid,derivative by diimide bond formation.

The potential of periodate method for-the preparation of steroid-enzyme conjugate for the determination of analyte, is demonstrated through the development of an ELISA for direct estimation of Cortisol in human serum sample's.

MATERIALS AND METHOD

Materials

Horseradish peroxidase type VI (EC 1.11.1.7), ADH, cortisol-3-O -carboxymethyl-oxime (cortisol-3-O-CMO), cortisol-21-hemisuccinate (cortisol-21-

HS), Bovine serum albumin (BSA), 1-ethyl-3- (3-dimethyl-amino-propyl) carbodiimide-HCI (EDAC), N-hydroxysuccinimide (NHS) and Freund's complete adjuvant were all purchased from Sigma Chemical Company, St.Louis, MO, USA. Tetramethyl benzidine (TMB) and H_2O_2 combined substrate reagent was purchased from Bangalore Genei, India. Microliter plates were procured from Thermo Lab system, India. All other chemical and buffer salts were of analytical grade.

Periodate Method of Conjugation of HRP with Cortisol-21-HS

Periodate Oxidation of HRP

Periodate oxidation was performed according to the method of Nakane et al[a]- with modification. Ten milligram of HRP type VI was dissolved in 1mL of distilled water. Freshly prepared 10pL of 100m(M) sodium meta-periodate was added to HRP solution to make aldehyde group from vicinal hydroxyl group of sugar moieties of HRP. Reaction mixture was kepLat room temperature in dark for half an hour. Activated HRP (HRP-aldehyde) was passed through Sephadex G-25 column, previously equilibrated with 0.09 per cent ammonium carbonate (pH 9.3) as mobile phase to remove Nal04.

Conjugation of HRP- Aldehyde to Hydrazide Group of ADH

1. Brownish fraction of activated HRP from G-25 column was directly collected in a vial containing 100mg of ADH and kept at 4° C for overnight to form hydrazone bonds.

2. The schiff-bases formed were stabilized by addition of 10uL of 5(M) sodium cyanoborohydride in 1 (M) NaOH and kept at 4° C for 3 hours:

3. After stabilization, conjugate was passed through Sephadex G-25 column previously equilibrated with 10m(M)PBS ($Na_2HPO_4.2H_2O$-0.895gm/L, $NaH_2P0_4.2H_20$ - 0.39gm/L and 0.9 per cent NaCI with 0.1 per cent Thimerosal). Brownish fractions of HRP coupled with ADH, were collected and pooled. It can also be kept at -30° C for future conjugation.

Conjugation of Cortisol -21- HS with ADH-coupled HRP

1. To 5 mg of cortisol-21-HS, 200uLof DMF, 200µL of dioxan and 100pl_ of distilled water containing 10mg of NHS and 20 mg of EDACwas added and kept at 4° C for overnight.

2. To the activated cortisol-21-HS, 1mL of ADH-HRP solution (- 1 mg of HRP) was added and reaction mixture was further kept at 4°.C for 24 hour for the formation of diimide bond between-NH2 of HRP coupled ADH and activated –COOH of cortisol-21-HS.

3. The reaction mixture was passed through Sephadex G-25 column using 10 m(M) PBS. The fractions containing enzyme activity were pooled and to it a 1 % of sucrose, ammonium sulfate, BSA and equal volume of ethylene glycol was added and kept at -30°C in aliquots for future use.

The scheme of reaction is given below:

First Step

periodate oxidation *+ NH_2 ~~~~~ NH_2*

Enz-Carbohydrate ----------->Enz. Aldehyde ----------> Enz.~~~~ NH_2

Final Step

+ COOH steroid

Enz.~~~~~H_2----------> Enz ~~~~~~ Steroid.

Generation of Cortisol Antibody for ELISA

Cortisol antiserum was generated against cortisol-3-O-CMO-BSA as immunogen, in New Zealand white rabbits[9].

Coating of Polystyrene Wells

Polystyrene wells of the microliter plate were coated with cortisol-3-O-CMO: antibody diluted in 10m(M)PBS, according to the method of Shrivastav et al[10].

Enzyme Conjugate Dilution

Cortjsol-21-HS-ADH-HRP was diluted in 10mM Na-acetate buffer (pH 5.6) containing 0:1 per cent'dextarn T-70, thimerosal and 0.3 per cent BSA. Optimal dilutions of antibody and enzyme conjugates were found out by checkerboard assay.

Standard Preparation

Six **Cortisol** standards (0pg/100mL, 1pg/100mL, 3pg/100mL, 10ug/100mL, 30pg/100mL and 60 ug/100mL) were prepared in stripped serum[9].

Substrate Preparation

According to the manufacturer's protocol, combined TMB/H_2O_2 reagent was diluted in distilled water in 1:20 ratio just before its use.

ELISA Procedure

Cortisol ELISA had been performed according to method of Basu and Shrivastav. Briefly, to the Cortisol antibody coated wells, 25pL of Cortisol standards or samples were added followed by 100pL of cortisol-21-HS-ADH-HRP in all the wells and incubated for one hour at 37° C. After incubation, the contents of the wells were flicked out and washed in running tap water. To measure the bound enzyme activity, IOOUL of substrate solution was added to all the wells and incubated for 20minutes at 37°C. The .enzyme reaction was stopped by adding 100µL of 0.5(M) H_2SO_4 and color was measured at 450nm.

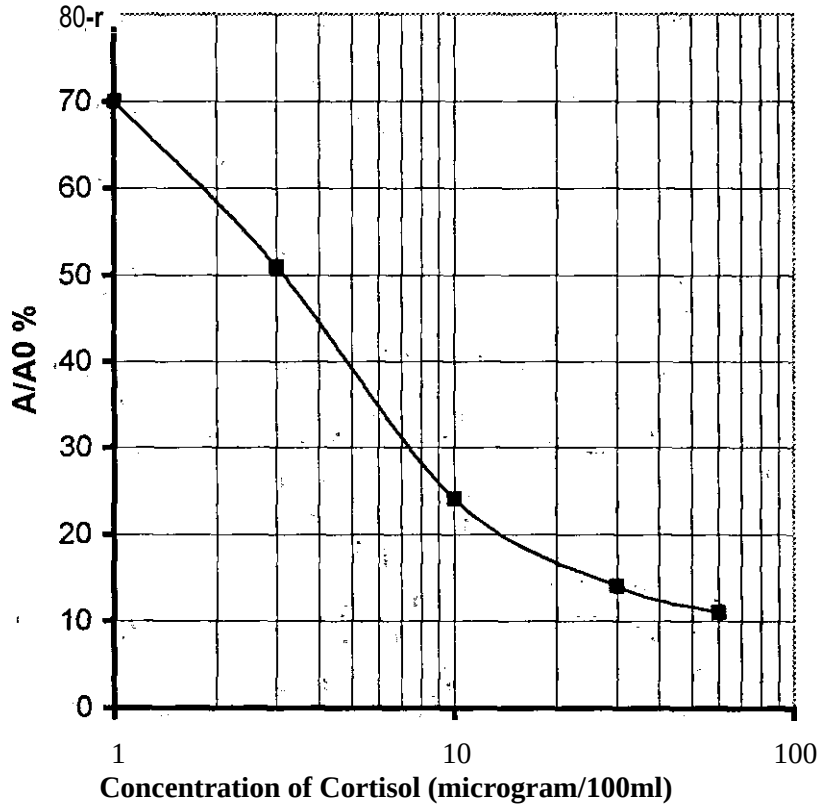
FINDINGS

Calibration Curve

The calibration curve of ELISA, using cortisol-21-HS-ADH-HRP as enzyme conjugate is presented (Fig.1), Concentrations of the cortisolcalibrators were plotted on X-axis in log scale and absorbency was plotted on Y-axis in liner scale of the semi-log graph paper.

FIGURE 1

Dose response curve; in semi-log graph, of Cortisol assay using Cortisol-HRP conjugate employing periodate reaction as a means to introduce amino group in HRP



Sensitivity of the Assay

The sensitivity of the assay, using cortisbl-2i-HS-ADH-HRP as enzyme conjugate was 0.05µg /100ml

Specificity of the Assay

The degree of cross-reaction with other steroids in this Cortisol ELISA are given in Table 1.

TABLE 1
CROSS-REACTION OF CORTISOL-3-O-CMO ANTIBODY IN ELISA USING CORTISOL-21-HS-ADH-HRP ENZYME TRACER

Cross-reacting Analyte	Cross-reactivity (in %)
Cortisol	100
Corticosterone	1.7
Cortisone	10
17αOH- Progesterone	6
Predinisolone	4
Dexamethasone	<0.1
Other C_{27}	<0.1
Other C_{21}	<0.1
Other C_{19}	<0.1
Other C_{18}	<0.1

Intra-assay and Inter-assay Variation

Table 2 shows the precision (Intra-assay and inter-assay coefficient of variation) result of the assay.

TABLE 2
INTRA-ASSAY AND INTER-ASSAY COEFFICIENT OF VARIATION (CVS) OF CORTISOL ASSAY USING CORTISOL-21-HS-ADH-HRP ENZYME TRACER

Sample No	Mean ±SD	Coefficient of Variation (CVs) in %
Within assay		
Sample pool 1	1. 5±0.9	9.0
Sample pool 2	3.2±1.0	5:3
Sample pool 3	15.8±0.8	5.4
Sample pool 4	26.7±1.2	1.3
Between assay	1.8 ±0.7	12.0
Sample pool 1	3.8 ±0.9	12.6
Sample pool 2	16.2+1.2	8.0
Sample pool 3	27.2±0.8	6.8

DISCUSSION

We have used enzyme Horseredish Peroxide (HRP) to prepare steroid enzyme conjugate for enzyme immunoassay through periodate method. HRP is one of the most popular enzymes used in immunoassay for its stability, wide pH range and high turnover. It is a 44Kda heam-containing glycoprotein containing only six-lysine residues which can be used for direct coupling with carboxylate group of steroid derivative. It is reported that in some commercial preparations theselysine residues are not available for direct coupling. This may be due to the blocking of amino groups of lysine residue by allylisocyanate. While purification of HRP'from the roots of horseradish plant occurs, a component of it called sinigrin, is prone to release allylisothiocyanate which is likely to react with the enzyme's amine groups to form thioureas. Since any of the resulting thioureas are quite stable, these lysines are not useful for derivatization. Importantly, differences in extraction conditions-of commercial preparations are. likely to lead batch-to-batch variation in number of reactive amines that survive from this process. Nonavailability of amino group in HRP is the major constraint for conjugation between HRP and carboxylic group of hapten through_amino bond[6]. HRP contains 20 per cent of carbohydrate, consisting of mannose, N-acetyl glucosamine, xylose and fucose[13]. These carbohydrate residues are the good sites for derivatization without loosing the enzyme activity[14]. In the present procedure, ADH has been used as amine containing homobifunctional reagent to couple steroid with enzyme HRP. It is a 10-atom cross-linking reagent containing hydrazide group at both the ends. Other homobifunctional reagents like ethylene diamine, 1,3-diaminopropane, diaminodipropyl amine and 1,6-diaminohexane may also be used. This reported procedure may also be applicable for other glycoenzyme like alkaline phosphatase (AP) from calf intestine. Calf intestine AP which is quite heavily glycosylated containing around 10-20 per cent of carbohydrate consisting of N-glycan, 0-glycan, galactose, manose, fucose and N-acetylglucosamine.

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सामान्यतः स्ट्रायड के यौगिक कार्बोजिल इन्झाइम के एमिन समूह के साथ संयुग्मित होते हैं। स्ट्रायड के यौगिक कार्बोजिल संयुग्मन से एसिड बांड संरचना के माध्यम से इन्जाइम के एमिलों समूह के लिए केवल यही एक अनुक्रिया यंत्र–विन्यास उपलब्ध है। कभी–कभी इन्झाइम में एमिनों समूह की अनुलब्धता के कारण इन्झाइम के साथ स्ट्रायड यौगिक का संयुग्मन कठिन होता है। यहां इन्झाइम में एमिनों समूह के प्रयोग के पश्चात कार्बेडिमाइड मडिएटिड एनहाइड्रोक्सी सुसिनिमाइड द्वारा स्ट्रायड के यौगिक कार्बोजिल के साथ संयुग्मन के लिए कालावधि विधि का उल्लेख किया गया है। इस नई रणनीति में, इन्जाइम में सक्रिय एल्डिहाइड समूह सृजित करने के लिए सोडियम मेटापेरिओडेट द्वारा पहले आक्सीडाइज किया गया था तत्पश्चात इसमें एडिपिक एसिड डिहाइड्राजाइड (एडीएच) की अतिरिक्त मात्रा डाली गई थी, इन्जाइम के एल्डिहाइड समूह तथा एडिपिक एसिड डिहाइड्रजाइड के हाइड्राजाइड समूह के मध्य एक अनुक्रिया के माध्यम से समद्विकार्यात्मक अनुप्रस्थ श्रृंखलन द्वारा हाइड्रोजन बांड की संरचना की गई थी। डिमाइड बॉड संरचना के माध्यम से स्ट्रायड–इन्झाइम संयुग्मन तैयार करने के लिए इन्झाइम एडिपिक एसिड डिहाइड्राजाइड (इन्झाइम–एडीएच) संशिलिश्ट प्रयोग किया गया है।

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