ORIGINAL RESEARCH PAPER

Pediatrics

CLINICAL PROFILE OF ADOLESCENT GROWTH IN TERMS OF BMI, SEXUAL MATURITY RATING AND SUBSTANCE ABUSE IN ADOLESCENT SCHOOL AGE BOYS AND GIRLS.

KEY WORDS: clinical profile, body mass index, sexual maturity rating, behavioural pattern , adolescent school age boys and girls.

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ABSTRACT

This cross sectional study included 760 adolescent(400 boys and 360 girls) in four bharatpur schools. The main objectives were to study the clinical profile of adolescent growth in terms of height, weight, body mass index, sexual maturity rating and to assess the behavioral pattern including violent behavior, sexual behavior and substance abuse in adolescent school age boys and girls. Prevalence of awareness of sexual problems is more in mid/late adolescent compared to early adolescent (in both boys and girls). Occurrence of awareness of about sexual problems is more in case of boys compared to girls. Prevalence of awareness about sexual problems is more in mid /late adolescent boys compare to early adolescent boys. Prevalence of awareness about sexual problems is more in mid /late adolescent girls compare to early adolescent girls. There is no significant difference in incidence of violent behaviour in early and late adolescent. Prevalence of violent behaviour is more in boys compare to girls. Occurrence of violent behaviour is more in case of mid/late adolescent boys compare to early adolescent boys. Frequency of violent behaviour is more in case of mid/late adolescent girls compare to early adolescent girls.

INTRODUCTION

Adolescence is a journey from the world of childhood to the world of adulthood. The first use of the term adolescence appeared in the 15th century. The term was a derivative of the Latin word adolescere, which means to grow up or to grow into maturity .

WHO defines adolescents between the age of 10 – 19 years, Youth between 15 – 24 years and young people between 10 – 24 years. Adolescent period is divided into early (10 – 13 years), mid (14 – 15 years) and late (16 – 19 years)1.

During adolescent span of one decade from 10 to 19 years, important development tasks like identity formation, independence and growth have to take place. There may be many differences on when and how these changes takes place during adolescence and these are closely related to race, sex. ethinic background, scocioeconomic class and family value system .

Adolescents are no longer children nor they are adults and the changes in this period are full of paradox. Biologically they can become mother or father without being ready for the responsibility. They feel the need of growing sense of independence. And as they change, their need changes with time. For the rapid growth and special nutritional needs they are vulnerable to malnutrition and stunting, obesity, sexual problems, smoking, alcohol intake, substance abuse, violent behavior and other behavioural disorders.

To ensure that teens and adults navigate this transition successfully, it is important for both to understand what is happening to the adolescents physically, cognitively, emotionally, socially and how this transition affects them, what adults do to support them, and what resources are available. Therefore one has to know the local or regional problems of adolescents to plan and organize preventive, promotive and curative services for them.

Adolescent accounts for one fifth (20%) of world population(1.2 billion) of which about 500 million are in South East Asia Region(SEAR). Adolescent makes 22% of the total population in Nepal."National adolescent health and development strategy" was prepared by family health division, ministry of health and population in Nepal. Adolescent problem in Nepal mainly includes nutritional problems, reproductive health problems, psychosocial problems, health risk behaviours like substance abuse, unprotected sex, and unintentional injuries.

This study is done to find out the growth and behavioural profile of

adolescent school age boys and girls. The study highlighted the local behavioural problems and growth disorders of school adolescents.

MATERIALS AND METHODS

Study Design and Setup:
The cross sectional study of adolescent school age boys and girls was done in four schools of bharatpur municipal area during May 2008 to April 2009.

Sample and Place of study:
This study was undertaken in four schools having different socio-economic and environmental background of students and separately placed geographical area of municipal area of Bharatpur. The selection of school was also subjected to approval of school administration to conduct the study, which is attached at appendix. Schools Names are:
- Greenland Public School
- United Scholars Academy
- Eden Garden Higher Secondary School
- Sunrise School

Sample:
Sample consisted 760 adolescents, which included 400 boys and 360 girls student of class six to ten.

Inclusion Criteria
All the students of the class on the days of examination who gave consent for physical examination, including SMR staging by investigator self evaluation of SMR by candidate and also filled up the Nepali questionnaire appropriately were included in the study.

Exclusion Criteria
Students who had not consented were not enrolled for the study. Any student who had given consent but with inadequate physical examination or without self evaluation of SMR staging and incompletely filled predesigned questionnaire performa were excluded from the study.

Methods
Delivery of health care to adolescence is very special issue Confidentiality and delivery of age appropriate care were the primary issue that we strictly followed in the present study. Quality of care is maintained. Spontaneous participation of adolescent by their own consent was the mainstay of this service. We were flexible and adaptable during each visit so that we can easily

recognized and respond to culture, ethnicity and social diversity of different adolescents. It was always kept in mind that the complexity and interaction of physical, cognitive and psychosocial developmental process during adolescence require sensitive skills on the part of investigator.

After proper consent and explanation regarding the study details, thorough history, physical examination will be done and recorded by investigator in case performa and every student who is included in the study will be asked to fill up the questionnaire written in Nepali language.

The details of clinical examination were recorded only by the investigator. To maintain the secrecy, name and personal data was not mentioned in the case performa. Only age, sex and clinical evaluation related to study were recorded. Complete health check up was done. Height and weight was recorded and body mass index (BMI) calculated. Sexual maturity rate (SMR) was assigned as described by Tanner4.

The questionnaire included in case performa is based on American Medical Association publication "Guidelines for Adolescent Preventive Services (GAPS)5. (The GAPS guidelines having been designed exclusively for adolescents tend to be more specific in stating the criteria for intervention and referral). And it was modified by a National workshop with the help of The national experts under support of World Health Organization. A present questionnaire was made to know the behaviour pattern, sexual and reproductive health knowledge, peer group relationship, food pattern and common daily problems of the adolescents. No data related to personal identity was filled up in the questionnaire. Only age and sex were recorded. Every student was asked to fill up the questionnaire in isolation. Therefore every student was feeling completely free to mention the facts, which will make the study authentic.

Different visits were done on different dates for different classes with prior appointment from school authority. The teachers were requested to inform their students about their health check-up primarily and the class teacher remained present during the examination.

Entering into the class on the prefixed date, we first try to establish relationship with adolescent boys and girls of the same class. Investigator tried to make them understand about what is adolescence, what are basic need in adolescence period, whether there are any issue of concern among the adolescent, why the adolescent needs more attention. Then we gave them those preset questionnaires in Nepali version. They were asked to fill up the questionnaires by their own and we promised them that their confidentiality would be strictly maintained. Actually each questionnaire did not contain any column of individual identification. Investigator and his team were constantly available for any clarification of any question in those questionnaires.

While students were filling up the question paper they were examined one by one for weigh, height and blood pressure. The weight was recorded on a beam type of weighing scale. Before weighing, the scale is checked with standard weight and zero error was adjusted. Though weight should be taken with minimum garments but in school it was not possible. The students were asked to put off their shoes and then they were asked to stand on the weighing machine. Weight was measured and then plotted against standard growth chart redesigned by Agarwal KN, Agarwal DK, Bansal AK for the Indian Academy of Pediatrics6, since no standard growth chart is available for Nepali standard. Photograph of growth chart is attached.

A detail clinical examination was done as per predesigned performa enclosed herewith for each student. Those who had significant pathology were asked to attend College of Medical Sciences, Bharatpur, Nepal for further evaluation.

In schools we arranged separate room for examination of boys and girls. Sexual maturity rate (SMR)was done as described by Tanner8. Boys were examined by investigator and girls were examined by

lady intern doctor for their SMR staging. We obtained consent for SMR examination by proposing that we want to examine whether you are growing at per your sexual maturity. The adolescent who prefer self examination were explained about Tanner's staging by demonstrating photographs (photograph 1 and 2). Many of them subsequently could be convinced to consent for clinical examination. After that those who allow examination were examined for SMR staging.

RESULT AND DISCUSSION
Due to change of body images and appearance of secondary sexual character adolescent may become very much apprehensive during this period of time. We the doctor have to solve these problems. Before solving this problem, it is very important to put a chart of normal growth curve before them, according to their age & sex. So that, we can make them understand that the physical changes they face are absolutely normal and according to their corresponding age. Also we can interfere earlier if we see any variation from the normal values. This current study finds out some normal values of the Bharatpur based adolescents of lower middle & middle class family. Adolescent behaviour is complex to understand. There are many behavioural aspect and these are varying as per age changes. Here few such behaviour studied.

Height
This study showed among girls height starts to begin very rapidly from the age of 12 years Where as in case of boys it starts to beign maily from 14 years of age. Among 11 years boys & girls, girls have more mean height than boys as shown in. Gain in height is maximum in 12 – 13 years among girls. At 13 years average height among girls and boys become more or less same (152.32cm for boys and 153.07cm for girls). Then boys starts to gain height faster than girls. Peak height velocity among boys is in between 14 – 15 and 15 – 16 years of age then gradually the boys attain much more height than girls at the end of late adolescence period. At 17 years age group mean height difference of a boy and girl is 5.51 cm .

Agarwal et al study5, showed that at the age of 11 and 12 years girls have more height than boys. Height spurt begins in case of adolescent boys on 13 years onwards and it ends in 15 years. Peak height velocity occurs at 14 – 15 years. Whereas girls peak height velocity occurs at 11 – 13 years. In late adolescence period total gain in height in case of girls is much less than boys. And at the end of 17 years the basic height difference between boys & girls is 11 cm. The height spurt seen in Agarwal et al study5 in adolescent boys and girls are at similar age as seen in the present study. The 17 years height for boys and girls was described in Agarwals et al study was 168.7(50th centile) for boys and 160.5 (50th centile) for girls, 166.83 cm for boys and 161.32 cm in girls in comparison to that of present study. This is difference may be due to the difference in country, region, socio economic status of the study population. In the present study it was lower middle class and middle class population whereas in Agarwal's study it was affluent population.

In Indian Council of Medical Research (ICMR) standard6 which are specially meant for average Indian population this value is much different in case of boys(ICMR mean ht for 17 yrs boy is 175 cm) from the studied value, where as in case of girls it is more or less equal(163 cm).This is may be due to the difference in geographical , race difference and other factors.

Following the NCHS standard boys start of gaining height occur at the age of 12 – 13 years and the average mean height of American boy at the age of 17 years is 176.2 cm, which is much more than of our study. Whereas in case of girls also start of height starts to gain at the age of 11 – 12 years. The mean average height at the age of 17 years is 163 cm that is also higher than of our study. This is probably due to the difference in race .

On the other hand if we compare our value with Tanner's study8 it is seen that average puberty height spurt start in 13 – 14 years in case of girls which is slightly later than this study report. Onset of height spurt described by Tanner8 half a century ago was around 2 years later (13 – 14 years) than observation of this study and may be due to secular trends in growth.

Present study showed that overall prevalence of Short stature (<3rd centile) is 4.5%. The present study also showed that there is no significant difference of prevalence of short stature between the age group 10-13(early adolescent) and 14-17(mid and late adolescent). (p value.079) So there is no significant difference in short stature among early and late adolescent overall.

The present study showed that prevalence of short stature in case of boys is 5.8% and in case of girls 3.1%. The prevalence statistically is not significant(p value 0.143). So there is no difference lies in between adolescent boys and girls short stature.

Among boys prevalence of Short stature (<3rd centile) is 5.8% (Table 6. Between the age group10-13(early adolescent) and 14-17 (mid and late adolescent) percentage of stunting is more in mid/late age group which is 6.6% compared to early adolescent age group which is 5.2% but statistically it is not significant(p value 0.16). So there is no significant difference lies in prevalent of stunting in between early and mid/late adolescent boys.

This study also showed prevalence of less no of total percentage of stunting in mid/late adolescent boys. Agarwal et al 5 study showed that the prevalence of stunting drops down sharply at 14 years of age. This is likely due to the pubertal growth which occurs at this age5

The prevalence of short stature among girls is 3.1% (table 8) . Between the age group10-13(early adolescent) and 14 -17 (mid and late adolescent) percentage of stunting is more in mid /late adolescent age group which is 6.0% compared to 1.6% in early adolescent age group. The difference in prevalence is statistically significant as well(p value 0.00). So prevalence of stunting is more in late adolescent girls.

Study done by Anand K et al showed that the prevalence of stunting drops down sharply at 14 years of age20. The difference between the result of the present study and Anand K et al study may be due to place, geographical region, race difference socio economic factor and other factors as well.

In Dasgupta P et al study the prevalence rate of stunting differ from present study. Dasgupta P et al study which was done in Kolkata on middle class family showed prevalence of stunting is 11.2% which is more than present study(4.5%). Dasgupta et al study used NCHS reference data. This might explain the difference of prevalence of stunting.

Weight:
In the present study at the age of 11 years girls and boys weight is more or less equal (boys 40.93kg and girls 38.14kg). Then girls start gaining weight more early in early adolescence period. Maximum weight gain i.e. 5.69 kg /years occurs at the age of 12 – 13 years in girls. Then becomes slow. Whereas in case of boys maximum weight gain (9.13 kg/year) occurs in the period of 14 – 15 years of age.

Though in early adolescence girls are to some extent heavier than boys around the age of 13 years but in late adolescence like height boys become heavier than girls. Average weight at 17 years in the present study is higher (for both boys & girls) than that of Agarwal et al study5 although the difference remains comparable. This higher value of mean body weight may be due to inclusion of higher number of over weight adolescents as seen increasing in recent years.

The present study compared with Agarwal et al study3 result, which showed that peak weight gaining velocity of boys is also almost at the age of 14 – 15 years and 12 – 13 years in case of girls. At the age of 17 years mean weight of girls is 49 kg and boys 56.6 kg. Weight difference at the age of 17 years between boys & girls is 7.6kg which is more or less similar with that of present study.

According to ICMR study standard 6, though maximum weight gain occur in case of boys in 13 – 15 years and in case of girls in 12 – 13 years that is comparable with the present study. But mean weight in ICMR standard both in case of girls and boys are far more

less than this study result. At the age of 17 years the mean weight of girls and boys are 42.4 & 45.7 kg. The difference of boys and girls in ICMR at the age of 17 years only 3.3kg. The difference in mean value at 17 years is probably due to inclusion of overweight / obese adolescents.

Compared with NCHS standard , though peak weight velocity occurs in case of boys in the age of 13 – 15 years and in case of girls 12 – 14 years in present study but mean weight of boys and girls are greater than this study. This may be due to the difference in ethnic population , genetic factor and other factors as well.

The present study showed overall prevalence of overweight(according to weight>97 th centile) is 3.3%, under nutrition prevalence is 1.1%. There is statistically significant difference is present in prevalence of under nutrition in early (10-13) and late (14-17) adolescent (p value 0.005.) So under nutrition prevalence is more in case of early adolescent.

The present study also showed that there is difference in prevalence of under nutrition in boys and girls, but this difference statistically not significant(p value 0.089). So there is no difference lies in prevalence of under nutrition in between boys and girls.

Present study showed prevalence of under nutrition is more in early adolescent boys compared to mid/late adolescent boys. This difference is statistically significant as well (p value 0.041). So prevalence of under nutrition is more in case of early adolescent boys.

In the present study prevalence of under nutrition differ among early and late adolescent girls but this difference statistically not significant(p value 0.019). So there is no difference in prevalence of under nutrition in between early and mid/late adolescent girls.

BMI
Present study showed prevalence of overweight 4.9% and prevalence of obesity is 3.9% and underweight is 32.4% in the overall study population. The prevalence of early adolescent and mid/late adolescent underweight ,overweight and obesity varies. Prevalence of underweight in early adolescent group is 43.8% whereas in mid/late adolescent it is 11.2% . There is statistically significant difference is present between this two age group (p value 0.00). So prevalence of underweight is more in early adolescent age group.

This study showed that prevalence of overweight also varies among early adolescent and mid/late adolescent. Prevalence of overweight in early adolescent is 3.2% whereas in mid/late adolescent it is 7.9%. Statistically the difference is significant(p value 0.00). So prevalence of overweight is more in case of mid/late adolescent.

Present study also showed that prevalence of obesity varies in between early and mid/late adolescent age group. Prevalence of obesity in early adolescent is 3.0% whereas in mid/late adolescent it is 5.6%. There is statistically significant difference lies in the prevalence of this two age group(p value 0.00). So obesity prevalence is more in case of mid/late adolescent age group.

The present study showed difference in prevalence of underweight , overweight and obesity according to sex. In boys prevalence of underweight is 34.5% where as in girls prevalence is 30.0%. Statistically there is no difference of prevalence of obesity according to sex (p value 0.064). So there is no significant difference in prevalence of underweight in between boys and girls. This study also showed that prevalence of overweight varies among boys and girls. In case of boys it is 5.8% whereas in case girls it is 3.9% but statistically this difference is not significant(p value 0.064). So there is no significant difference of overweight among boys and girls.

This study also showed that difference in prevalence of obesity among boys and girls. In case of boys it is 5.0% whereas in case of girls it is 2.8% but statistically this difference is not significant(p value 0.064). So there is no difference in prevalence of obesity in

boys and girls.

Present study showed difference in prevalence in underweight, overweight and obesity among early and mid/late adolescent boys. In early adolescent boys prevalence of Underweight is 48.6% where as in mid/late adolescent boys it is 11.3%. Statistically this is significant(p value 0.00). So prevalence of underweight is more in case of early adolescent boys.

In this study prevalence of overweight among early and mid /late adolescent boys is different. Early adolescent it is 4.0% and mid/late adolescent it is 8.6%. The difference is statistically significant(p value 0.00). So prevalence of overweight is more in mid/late adolescent boys.

This study also showed that prevalence of obesity varies among early and mid/late adolescent boys. Early adolescent boys prevalence is 3.6% whereas mid/ late adolescent it is 7.3%. There is significant difference in the prevalence of early and mid/late adolescent (p value 0.00). So prevalence of obesity is more in case mid/ late adolescent boys.

Present study showed difference in prevalence of underweight, overweight and obesity among early and mid/late adolescent girls. The prevalence of underweight in early adolescent girl is 38.9% whereas in case mid /late adolescent it is 11.2%. Statistically this prevalence difference is significant (p value 0.00). So prevalence of underweight in early adolescent girls is more compare to mid/late adolescent.

In the present study prevalence of overweight in early and mid/late adolescent girls is 2.5% and 6.9% respectively. The difference is statistically significant as well (p value 0.00). So prevalence of obesity in late adolescent girls is more compare to early adolescent. In the present study prevalence of obesity among girls showed the same tendency as overweight. Prevalence in mid/late adolescent obesity is more which is 3.4% compare to early adolescent which is 2.5%. This difference is statistically significant(p value 0.00). So prevalence of mid /late adolescent girl is more compare to early adolescent.

Study done by K Anand et al 8 showed prevalence of thinness did not follow any particular trend which has similar trend if it compared with present study overall population . Prevalence of thinness was calculated as per NCHS norms in K Anand et al study. Prevalence of thinness according to sex showed similar trend compared to present study , in case of girls(K Anand et al 30.1% and present study 30%). Prevalence of thinness in boys was 43.8% (which is more than the present study 34.5%) .

The difference in observation might be due to study population, for study population sample they selected only one rural school in K Anand et al study . Difference might be due to race and geographical variation as well.

Study done by et Subramanyam V7 et al (on prevalence of overweight and obesity in affluent adolescent girls) showed higher prevalence of overweight and obesity compare to present study in case of girls .The study showed 9.67% and 6.23% prevalence overweight and obesity respectively. The difference is due to study population . The present study was done in mixed lower, middle and upper class children where as Subramanyam V7 et al study was done on affluent society.

Sexual Maturity Rate(SMR):
Although some of the study population may not correctly assessed their maturity, but a good no. of adolescents boys and girls had correctly mentioned their SMR Which was substantiated by the investigator in this study who had consented for same after self assessment.

In the study by Neinstein LS et al 9, of 22 adolescents boys and 22 adolescents girls, it was seen that self assessment of girls SMR is valid one but self assessment of boys SMR needs further study. In the current study we can see that both boys and girls can quite efficiently mention their SMR.

The present showed that majority of boys attained puberty by age between 12-14 years whereas in girls majority of them attained puberty by 11-12 years age

The present study showed that majority of boys attained SMR2 stage (according to Tanner classification 8) are in between the age 12-14 years. In case of girls majority of them are in SMR stage 2(according to Tanner classification 8) in between 11 – 12 years age. Majority of the boys achieved SMR3 and SMR4 stage in between 15 to 17 years where as in girls majority of them achieved SMR3 and SMR4 in between 14 to 16 years of age.

Study done by Agarwal et al5 showed 75% boys achieved T2 during 11-13.5 years off age. The mean age for T2 was 11.5 years. In case of girls 80% of them was in B2 stage in the age group 10-13 years. The mean age for B2 was 10.2 years which is comparable to this study.

Study done by Kaplowitz PB 9 showed that breast and pubic hair development occur significantly earlier in Afro-American girls, which proposed it is pathological only if it is occur before 7 years of age in case of white girl and 6 years if it is Afro-American girl. So variation of result with the present study may be due to race, geographical variation, nutritional status , socio economic status .

Substance Abuse:
In the present study prevalence of overall substance abuse is 9.3%.The present study showed difference in prevalence of substance abuse in between early and mid/late adolescent. Prevalence of substance abuse in early adolescent is 8.5% whereas in late adolescent it is 10.9%. Statistical analysis showed statistically it is not significant (p value 0.56).

Present study showed that boys and girls prevalence of risk of substance abuse are different . In case of boys it is 14.2% but in case of girls it much less 3.9%. The difference in prevalence is statistically significant (p value 0.00) as well. So prevalence of substance abuse is more in case of adolescent boys.

This study also showed that in early and mid/late adolescent male prevalence of substance abuse is different. In case of early adolescent it is 13.7% whereas in case of late adolescent it is 15.2%. There is statistically significant difference is present in case of substance abuse(p value 0.015) in case of early and late adolescent boys .Late adolescent boys have more prevalence of substance abuse compare to early adolescent boys.

The present study showed in case of girls there is difference between early and mid/late adolescent age group. Prevalence of substance abuse in case of early adolescent girl is 3.3% whereas in case of mid/late adolescent it is 5.2%. There is significant different lies (p value 0.010) between this two prevalence value. So prevalence of substance abuse in late adolescent girl is more.

This study also showed prevalence of different substance abuse . The prevalence of tobacco abuse is 8.4% which is the highest among all the substance which are abused. Prevalence of alcohol abuse is much lower compare to tobacco which is 0.8%. Other substance(heroin, ganza, intravenous drug) abuse prevalence is much lower even which is0.1% . There is statistically significant lies in between these three groups of substance(p value0.00). Present study showed tobacco is commonest substance which is been abused.

Nepal Adolescent and Young adult (NAYA)9 survey showed that one quarter of young boys and 10% girls have smoked tobacco at some time or other. Region wise survey showed smoking is more prevalent in urban areas.

Ministry of Health Nepal6 data is showed 24.6% male aged between 15-19 years smokes and has consumed alcohol, 47.4% has consumed alcohol, 36.7% smokes bidi/cigarettes. This prevalence rate is much higher compared to the present study. The difference might be the population studied, as NAYA study included age group up to 19 years. Other factors might be

Bharatpur is multiracial semi urban town where population are mixed , awareness in school going adolescent about adverse effect of substance abuse and despite of reassurance regarding data protection   adolescent subjects did not   reveal the right information.

GYTS5 data for Nepal showed high number of tobacco use in case of male (1 in 10) where as in case of female it is significantly lower which is comparable to the present study.

GYTS5 Survey india (Bihar) showed   much higher prevalence of smoking in adolescent compare to present study which is 58.9% over all and 61.4% and 51.2% male and female respectively.

WHO(UNICEF)4 survey 2001 showed more than 1 in 10 nepali teenager admitted to taking drug but this study did not show any drug user.

Awareness About Sexual Problems during Adolescent:
The present study showed prevalence of awareness of sexual practice during adolescent, it include awareness about the many adverse health consequences like STI, HIV, pregnancy. Present study showed difference in prevalence of awareness about sexual practice in mid/late adolescent period compared to early adolescent period. Mid /late adolescent period showed prevalence of 44.2%, whereas early adolescent period showed prevalence of 24.5% only. This difference in prevalence is statistically significant as well(p value 0.00). So prevalence of awareness of sexual problems is more in mid /late   adolescent compare to early adolescent.

This study also showed that there is difference in prevalence of awareness about sexual problem exit between boys and girl. In case of girls prevalence rate is 29.2% where as in case of boys it is 33.5% Statistically this difference is also significant(p value 0.006). So this study showed increase prevalence of awareness about sexual problems during adolescent period in boys compared to girls.

In this study there is difference in prevalence of awareness about sexual problems in early and mid /late adolescent boys. Prevalence of awareness in early adolescent is 26.9% whereas in mid/late adolescent it is 44.4%. This difference is statistically significant as well(p value0.00). So prevalence of awareness about sexual problems is more in mid/late adolescent period compared to early adolescent period.

Present study also showed that difference in prevalence of awareness in early and mid/late adolescent girls. Early adolescent girls it is 22.1% whereas in mid/late adolescent girl it is 44.0%. This difference in prevalence statistically significant as well(p value 0.00). So prevalence of awareness about sexual problems is more in mid/late adolescent compare to early adolescent.

This study data is comparable to UNICEF 2001 survey9 which showed awareness about adolescent sexual problem is more in case of male compare to female. Although   prevalence of awareness in UNICEF 2001 survey is more compare to this study. UNICEF 2001 survey showed 74% teenager have knowledge about how to protect themselves from HIV. The difference may be due to UNICEF survey included teenage group .

Violent Behaviour:
Present study showed there is difference in prevalence of violent behaviour in early and mid/ late adolescent age group. In early adolescent prevalence of violent behaviour is 7.3% whereas in mid/late adolescent it is 11.6%. Although statistically the difference is not significant (p value 0.126). So there is no significant difference in prevalence of violent behaviour in early and late adolescent age group .

In this study prevalence of violent behaviour in boys and girls are different. Boys showed prevalence of 11.5% whereas girls showed prevalence of 5.8%. This difference is statistically significant (p value 0.01) as well. So prevalence of violent behaviour is more in case of boys compare to girls.

Present study showed difference in violent behaviour in early and mid/late adolescent boys. Prevalence of violent behaviour in early adolescent   boys is 9.6% whereas late adolescent it showed prevalence of 14.6%. The difference is statistically significant as well(p value 0.006). So this study showed prevalence in violent behaviour is more in case of mid /late adolescent boys compare to early adolescent boys.

This study also showed that there is difference in prevalence of early and mid/late adolescent girls. Prevalence of violent behaviour in early adolescent girls is 4.9% whereas in late adolescent it is 7.8%.

This difference of prevalence statistically significant as well(p value 0.022). So this study showed   violent behaviour in mid /late adolescent girls is more compare to early adolescent girls.

CONCLUSION
According to the present study we can draw some conclusion for those adolescents who represent mainly the middle class and lower middle class and higher class population of bharatpur. These are: Maximum height spurt occur in case of adolescent girls in 11 – 12 years of age. Maximum height spurt occur in case of adolescent boys in the year of 14 - 15 years. Final height achieved by late adolescent boys in 17 years is 5.51cm higher than corresponding girls of same year. Overall prevalence of short stature is 4.5% among both boys and girls. Prevalence of stunting is more in mid/late adolescent girls and occurrence of underweight is 32.4% in both boys and girls. There is no significant difference in prevalence of underweight, overweight and obesity in between boys and girls. Incidence of violent behaviour is more in case of mid/late adolescent boys compare to early adolescent boys. Prevalence of violent behaviour is more in case of mid/late adolescent girls compare to early adolescent girls.

Table: Distribution of mean age in two groups

		Boys	Girls	Total	Mean Height in boys(cm)
Age of children	10 plus up to 11 completed year	30	49	79	
	11 plus up to 12 completed year	69	49	118	
	12 plus up to 13 completed year	74	84	158	
	13 plus up to 14 completed year	76	62	138	
	14 plus up to 15 completed year	46	58	104	
	15 plus up to 16 completed year	70	39	109	
	16 plus up to 17 completed year	35	19	54	
	Total	400	360	760	
Age	10 plus up to 11 completed year	30			144.47 ±SD
	11 plus up to 12 completed year	69			145.42 ± SD
	12 plus up to 13 completed year	74			152.32 ±SD
	13 plus up to 14 completed year	76			158.93 ±SD
	14 plus up to 15 completed year	46			162.07 ±SD

	15 plus up to 16 completed year	70		165.74 ±SD
	16 plus up to 17 completed year	35		166.83 ± SD
	Total	400		
Age	10 plus up to 11 completed year		49	146 SD
	11 plus up to 12 completed year		49	149.43 SD
	12 plus up to 13 completed year		84	153.07 SD
	13 plus up to 14 completed year		62	154.79 SD
	14 plus up to 15 completed year		58	155.21 SD
	15 plus up to 16 completed year		39	160.15 SD
	16 plus up to 17 completed year		19	161.32 SD
	17 completed years		360	

Table: Association of height vs. age group

Height Reference Value[7]			Stunting (≤than 3rd centile	Normal 3rd to 97 centile 50	tall stature≥ than 97th centile	Total
Age Group	10-13	Number	17	459	17	493
		% within age group	3.4%	93.1%	3.4%	100.0%
		% within Stunting	50.0%	66.0%	54.8%	64.9%
		% of Total	2.2%	60.4%	2.2%	64.9%
	14-17	Number	17	236	14	267
		% within age group	6.4%	88.4%	5.2%	100.0%
		% within Stunting	50.0%	34.0%	45.2%	35.1%
		% of Total	2.2%	31.1%	1.8%	35.1%
Total		Count	34	695	31	760
		% within age group	4.5%	91.4%	4.1%	100.0%
		% within Stunting	100.0%	100.0%	100.0%	100.0%
		% of Total	4.5%	91.4%	4.1%	100.0%

Table: Association of height of boys & girls with age group

			Height[51] (Boys)				Height[51] (Girls)			
			stunting	normal	tall stature	Total	stunting	normal	tall stature	Total
Age Group	10-13	Number	13	224	12	249	4	235	5	244
		% within age group	5.2%	90.0%	4.8%	100.0%	1.6%	96.3%	2.0%	100.0%
		% within Stunting	56.5%	61.7%	85.7%	62.2%	36.4%	70.8%	29.4%	67.8%
		% of Total	3.2%	56.0%	3.0%	62.2%	1.1%	65.3%	1.4%	67.8%
	14-17	Number	10	139	2	151	7	97	12	116
		% within age group	6.6%	92.1%	1.3%	100.0%	6.0%	83.6%	10.3%	100.0%
		% within Stunting	43.5%	38.3%	14.3%	37.8%	63.6%	29.2%	70.6%	32.2%
		% of Total	2.5%	34.8%	.5%	37.8%	1.9%	26.9%	3.3%	32.2%
Total		Number	23	363	14	400	11	332	17	360
		% within age group	5.8%	90.8%	3.5%	100.0%	3.1%	92.2%	4.7%	100.0%
		% within Stunting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	5.8%	90.8%	3.5%	100.0%	3.1%	92.2%	4.7%	100.0%

Table: Association of height vs. sex of children

Height[51]			stunting	normal	tall stature	Total
sex of children	Male	Number	23	363	14	400
		% within sex of children	5.8%	90.8%	3.5%	100.0%
		% within Stunting	67.6%	52.2%	45.2%	52.6%
		% of Total	3.0%	47.8%	1.8%	52.6%
	Female	Number	11	332	17	360
		% within sex of children	3.1%	92.2%	4.7%	100.0%
		% within Stunting	32.4%	47.8%	54.8%	47.4%
		% of Total	1.4%	43.7%	2.2%	47.4%
	Total	Number	34	695	31	760
		% within sex of children	4.5%	91.4%	4.1%	100.0%
		% within Stunting	100.0%	100.0%	100.0%	100.0%
		% of Total	4.5%	91.4%	4.1%	100.0%

Table: Distribution of mean weight with age of boys and girls

		Number	Mean weight in Kg
Age in years (boys)	11(10 plus up to 11 completed year)	30	40.93
	12(11 plus up to 12 completed year)	69	42.06
	13(12 plus up to 13 completed year)	74	44.16
	14(13 plus up to 14 completed year)	76	47.54
	15(14 plus up to 15 completed year)	46	56.67
	16(15 plus up to 16 completed year)	70	58.43
	17(16 plus up to 17 completed year)	35	60.69
	Total	400	
Age in years (girls)	11(10 plus up to 11 completed year)	49	38.14
	12(11 plus up to 12 completed year)	49	40.00
	13(12 plus up to 13 completed year)	84	45.69

14(13 plus up to 14 completed year)	62	47.60
15(14 plus up to 15 completed year)	58	50.38
16(15 plus up to 16 completed year)	39	52.00
17(16 plus up to 17 completed year)	19	52.16
Total	360	

Table: Association of age group with weight of boys and girls

Age group		Weight[51] (boys)				Weight[51] (girls)			
		undernutrition	normal	overweight	Total	undernutrition	normal	overweight	Total
10-13	Number	8	463	22	493	6	231	7	244
	% within age group	1.6%	93.9%	4.5%	100.0%	2.5%	94.7%	2.9%	100.0%
	% within nutrition	100.0%	63.7%	88.0%	64.9%	100.0%	66.8%	87.5%	67.8%
	% of Total	1.1%	60.9%	2.9%	64.9%	1.7%	64.2%	1.9%	67.8%
14-17	Number	0	264	3	267	0	115	1	116
	% within age group	.0%	98.9%	1.1%	100.0%	.0%	99.1%	.9%	100.0%
	% within nutrition	.0%	36.3%	12.0%	35.1%	.0%	33.2%	12.5%	32.2%
	% of Total	.0%	34.7%	.4%	35.1%	.0%	31.9%	.3%	32.2%
Total	Numbert	8	727	25	760	6	346	8	360
	% within age group	1.1%	95.7%	3.3%	100.0%	1.7%	96.1%	2.2%	100.0%
	% within nutrition	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	1.1%	95.7%	3.3%	100.0%	1.7%	96.1%	2.2%	100.0%

Table: Association of sex of children with height of boys and girls

Height[51]			undernutrition	normal	overweight	Total
sex of children	Boys	Number	2	381	17	400
		% within sex of children	.5%	95.2%	4.2%	100.0%
		% within nutrition	25.0%	52.4%	68.0%	52.6%
		% of Total	.3%	50.1%	2.2%	52.6%
	Girls	Number	6	346	8	360
		% within sex of children	1.7%	96.1%	2.2%	100.0%
		% within nutrition	75.0%	47.6%	32.0%	47.4%
		% of Total	.8%	45.5%	1.1%	47.4%
	Total	Number	8	727	25	760
		% within sex of children	1.1%	95.7%	3.3%	100.0%
		% within nutrition	100.0%	100.0%	100.0%	100.0%
		% of Total	1.1%	95.7%	3.3%	100.0%

Table: Association of age group vs. BMI

BMI[51]			underweight	normal	overweight	obesity	Total
age group	10-13	Number	216	246	16	15	493
		% within age group	43.8%	49.9%	3.2%	3.0%	100.0%
		% within BMI	87.8%	55.0%	43.2%	50.0%	64.9%
		% of Total	28.4%	32.4%	2.1%	2.0%	64.9%
	14-17	Number	30	201	21	15	267
		% within age group	11.2%	75.3%	7.9%	5.6%	100.0%
		% within BMI	12.2%	45.0%	56.8%	50.0%	35.1%
		% of Total	3.9%	26.4%	2.8%	2.0%	35.1%
	Total	Number	246	447	37	30	760
		% within age group	32.4%	58.8%	4.9%	3.9%	100.0%
		% within BMI	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	32.4%	58.8%	4.9%	3.9%	100.0%

Table: Association of sex of children vs. BMI

BMI			underweight	normal	overweight	obesity	Total
sex of children	Boys	Number	138	219	23	20	400
		% within sex of children	34.5%	54.8%	5.8%	5.0%	100.0%
		% within BMI	56.1%	49.0%	62.2%	66.7%	52.6%
		% of Total	18.2%	28.8%	3.0%	2.6%	52.6%
	Girls	Number	108	228	14	10	360
		% within sex of children	30.0%	63.3%	3.9%	2.8%	100.0%
		% within BMI	43.9%	51.0%	37.8%	33.3%	47.4%
		% of Total	14.2%	30.0%	1.8%	1.3%	47.4%
	Total	Number	246	447	37	30	760
		% within sex of children	32.4%	58.8%	4.9%	3.9%	100.0%
		% within BMI	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	32.4%	58.8%	4.9%	3.9%	100.0%

Table: Association of age group with BMI of boys and girls

BMI (Boys)								BMI (Girls)				
			underweight	normal	overweight	obesity	Total	underweight	normal	overweight	obesity	Total
age group	10-13	Number	121	109	10	9	249	95	137	6	6	244
		% within age group	48.6%	43.8%	4.0%	3.6%	100.0%	38.9%	56.1%	2.5%	2.5%	100.0%
		% within BMI	87.7%	49.8%	43.5%	45.0%	62.2%	88.0%	60.1%	42.9%	60.0%	67.8%
		% of Total	30.2%	27.2%	2.5%	2.2%	62.2%	26.4%	38.1%	1.7%	1.7%	67.8%
	14-17	Number	17	110	13	11	151	13	91	8	4	116
		% within age group	11.3%	72.8%	8.6%	7.3%	100.0%	11.2%	78.4%	6.9%	3.4%	100.0%
		% within BMI	12.3%	50.2%	56.5%	55.0%	37.8%	12.0%	39.9%	57.1%	40.0%	32.2%
		% of Total	4.2%	27.5%	3.2%	2.8%	37.8%	3.6%	25.3%	2.2%	1.1%	32.2%
	Total	Number	138	219	23	20	400	108	228	14	10	360
		% within age group	34.5%	54.8%	5.8%	5.0%	100.0%	30.0%	63.3%	3.9%	2.8%	100.0%
		% within BMI	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.5%	54.8%	5.8%	5.0%	100.0%	30.0%	63.3%	3.9%	2.8%	100.0%

Table: Distribution of mean age in years in two groups

	Age in years (Boys)		Age in years (Girls)	
	Number	Mean weight in Kg	Number	Mean weight in Kg
11(10 plus up to 11 completed year)	30	40.93	49	38.14
12(11 plus up to 12 completed year)	69	42.06	49	40.00
13(12 plus up to 13 completed year)	74	44.16	84	45.69
14(13 plus up to 14 completed year)	76	47.54	62	47.60
15(14 plus up to 15 completed year)	46	56.67	58	50.38
16(15 plus up to 16 completed year)	70	58.43	39	52.00
17(16 plus up to 17 completed year)	35	60.69	19	52.16
Total	400		360	

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