

“A Study To Assess The Assessment Of Anemia And Body Mass Index (Bmi) Among Adolescent Girls At Selected Government High Schools At Visakhapatnam, Andhra Pradesh”

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ABSTRACT

Background of the study

Adolescent girls are future mothers. Nutritional status is an important determinant of their physical growth and development, which in turn determines the reproductive outcome. Health education and nutritional supplementation is important in this regard.

OBJECTIVES

- To assess anemia and body mass index (BMI) among adolescent girls.
- To find the correlation between anemia and body mass index (BMI) of adolescent girls.
- To find out the association between findings of the study with selected socio-demographic variables.

METHODS

A descriptive study was conducted among 95 adolescent girls aged 12-18 years studying government high schools, Vishakhapatnam using convenient sampling technique. A pre-test proforma was used to obtain the socio-demographic details. Hemoglobin was checked by True Hb hemometer and body mass index was assessed by measuring weight and height.

RESULTS

The results of the study reveal that the prevalence of anemia was 62.1% out of which 30.5%, 30.5% and 1.1% were mild anemic, moderate anemic and severe anemic respectively whereas 75.8% were of normal body mass index. Presence of anemia was statistically significantly associated with family monthly income ($p < 0.05$). A weak positive correlation was observed between anemia and BMI and it was not statistically significant at $p = 0.293$.

CONCLUSIONS

More than half of the adolescent girls are anemic. Emphasizes are needed for corrective measures of adolescent girls for anemia who are the future 'mother to be'. It also needs proper monitoring for effective utilization of nutritional supplementation provided by government. Hence, there is a need to create awareness among adolescent and their family about nutrition and health.

Keywords: adolescent girls, anemia, body mass index

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INTRODUCTION

“Adolescence” is a dynamically evolving theoretical construct informed through physiologic, psychosocial, temporal and cultural lenses. This critical developmental period is conventionally understood as the years between the onset of puberty and the establishment of social independence.¹ Adolescents are tomorrow's adult population and their health and well-being are crucial.² Adolescence is a unique intervention point in the life cycle that offers a chance to acquire knowledge about optimal nutrition during young adulthood that could prevent or delay adult-onset diet-related illnesses later on. It is a stage of Anemia is a condition in which the number of red blood cells or their oxygen-carrying capacity is insufficient to meet physiologic needs, which vary by age, sex, altitude, smoking, and pregnancy status (WHO).⁵ Anemia is characterized by a low level of hemoglobin in the blood.⁶ Hemoglobin is the protein inside red blood cells (National Cancer Institute)⁷ that is essential for transporting of oxygen to the lungs and other tissues and organs of the body. The basic physiologic defect caused by anemia is a decrease in the oxygen-carrying capacity of blood and consequently a reduction in the amount of oxygen available to the cells that declines hemoglobin level. The resulting hemodilution of severe anemia decreases peripheral resistance, causing greater quantities of blood to return to the heart. The increased circulation and turbulence within the heart may produce a murmur. Anemia is diagnosed findings on the history, physical examination and laboratory investigations.⁶

According to World Health Organization (WHO), anemia in adolescent girls are classified as: Normal (No anemia): Hb level >12 gm/dl; Mild anemia: Hb level >11 gm/dl to <11.9 gm/dl; Moderate anemia: Hb level >8 gm/dl to <10.9 gm/dl; and Severe anemia: Hb level <8 gm/dl.

Body Mass Index is an indicator of acute under nutrition which is defined as the weight in kilograms (kgs) by the square of the height in

receptivity to new ideas and a point at which lifestyle choices may determine an individual's life course.³

World Health Organization (WHO) has defined adolescents as children aged 10–19 years.² Nutrition influences growth and development throughout infancy, childhood and adolescence. However, nutrient needs are greatest during adolescence. Adolescent growth spurt results in 50% and 15 % increase in calcium and iron requirement and adolescent girls are more vulnerable, have lower priority and neglected in the family, hence they should be given more attention as they are future mothers.⁴

There is a tendency among adolescents to frequently consume carbonated drinks while the re is a lower inclination to eat fruits and vegetables. Moreover, habitual consumption of tea/coffee higher prevalence of anemia of 50% as compared to 34% in those who did not consume tea/coffee after meals.⁸ Moreover, following menarche, adolescent girls often do not consume sufficient iron to offset menstrual losses. Menstrual bleeding causes an additional loss of 0.4-0.5 mg daily. As a result peak in the prevalence of iron deficiency frequently occurs among adolescent girls.⁹

The clinical diagnosis of anemia based on signs and symptoms such as easy fatigability, lethargy, poor attention, poor concentration, pallor (late symptom) which is not easy to spot in dark adolescent girls but it is not possible to clinically diagnose anemia. Therefore, diagnosis of anemia should be always on the basis of hemoglobin estimation.

meters(kg/m²)[WHO]. It is a simple index of weight-for-height which is commonly used to classify underweight, overweight and obese. World Health Organization categorize the BMI-for-age as normal, very thin, thin, over weight and obesity.

The phenomenal growth that occurs in adolescence creates increased demands for energy and nutrients. Total nutrient needs are higher during adolescence than any other time in the lifecycle. Failure to

consume an adequate diet at this time can result in delayed sexual maturation and can arrest or slow linear growth.

nutrition and unhealthy eating habits. At the same important window of opportunity for interventions that promote the principles of a healthy eating life style - with potential to radically change the

NEEDFOR THE STUDY

'A better nourished world is a better world.'

Adolescents are 1.2 billion in number in the world today, constituting 18 per cent of the world's population. India is home to adolescents (243 million) than any other country. In Andhra Pradesh, the population of adolescent is approximately 9 million [Census of India, 2011].

Adolescence is the formative period of life when From screening of anemia and timely interventions like iron and folic acid supplementation may help in reducing the

OBJECTIVES

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METHODOLOGY

Source of data: The data was collected from adolescent girls aged between 12-18 years studying in 8th, 9th and 10th standard.

Research approach

Quantitative research approach was used for this study.

Adolescence is associated with a number of important nutritional issues such as seating disorders, micronutrient deficiency, obesity, under time this period provides an chronic disease landscape among adults across the world.

maximum amount of physical, psychological and behavioral changes takes place. Nutrition in general influences the growth and development throughout infancy, childhood and adolescence; it is however, during the period of adolescence that nutrient needs are the greatest,²¹ therefore nutritional status during adolescence impacts adult health and reproductive outcomes. Poor nutrition during the stage can sustain the inter generational cycle of malnutrition and can potentially retard growth and sexual maturation [Global Nutrition Report, 2017].³

prevalence of anemia. Hence, the present study is formulated to assess the anemia and body mass index among adolescent girls in high school

Research Design

A simple descriptive research design was used for this study.

Variables

Study Variables: Anemia and Body Mass Index (BMI)

Socio-demographic variables: Age, religion, standard of study, educational status of parents, occupation of parents, monthly family income, place of residence, place of stay, type of diet, eating junk foods, number of children in the family, birth order of the child, attainment of menarche

Setting

Government High Schools, Vishakhapatnam

Population:

Adolescent girls in the age group of 12-18 years studying in 8th-10th standard.

Sampling technique: Convenient sampling technique was used.

Sample and sample size: Ninety-five (95) adolescent girls aged 12-18 years studying in 8th, 9th and 10th standard at selected Government High schools, Visakhapatnam.

Selection criteria

1. Inclusion criteria: Adolescent girls who were,

- In the age group of 12-18 years.
- Willing to participate in the study.

2. Exclusion criteria: Adolescent girls who were,

- Not available at the time of the study.
- Diagnosed as iron deficiency anemia and taking iron supplementation.
- Diagnosed with chronic hematological disorders like thalassemia, leukemia, sickle cell anemia, hemophilia, idiopathic thrombocytopenic purpura.

Procedure for data collection

- Data collection was conducted during the month of March, 2018.
- A formal permission was obtained from the headmistress of Govt High School.
- Out of two schools, 110 participants were selected using convenient sampling technique. The student researcher explained about the purpose of research study and distributed the consent and assent forms to the participants. Only 95 participants were included at the time of study as four participants' parents denied to give permission to

participate in the study, two of them did not want to participate in the study due to fear of needle prick and nine were not available at the time of study.

- Socio-demographic questionnaire was distributed to participants and they were requested to complete the questionnaire.
- Hemoglobin level had been checked by pricking the ring finger or middle finger of non-dominant hand of each participant. The first drop of blood was wiped out and next drop of blood applied on test strip area in True Hb hemometer and read the Hb value within 50-60 seconds. The average time taken to check Hb level for each participant was 3-4 minutes.
- Weight was measured using calibrated manual weighing machine. Participants were instructed to empty bladder and remove extra clothing and foot wear and stand straight over the machine (head upright and hands hanging by the sides) with bare foot. Reading was taken to the nearest 0.1 kg.
- The height was measured using measuring tape. Participants were instructed to stand straight against the wall with occiput, scapula, buttocks, and heel (barefoot) in a straight line and touching the wall and arms hung at the sides in a natural manner. A measuring scale was gently applied at the top of the head and reading was taken to the nearest to 0.1 cm. The average time taken to check weight and height for each participant was 2-3 minutes.

Data analysis

The data was analyzed using both descriptive and inferential statistics.

RESULTS**SOCIODEMOGRAPHIC VARIABLES OF ADOLESCENT GIRLS**

TABLE 1.1 Frequency and Percentage distribution of sociodemographic variables in terms of age, religion and standard of the study.

Sl.No.	Sociodemographic variables	Frequency(f)	Percentage (%)
1.	Age		
	12-13years	19	20
	14-16years	75	78.9
	17-18years	1	1.1
2.	Religion		
	Hindu	66	69.5
	Christian	2	2.1
	Muslim	27	28.4
3.	Standard of study		
	8 th standard	32	33.7
	9 th standard	33	34.7
	10 th standard	30	31.6

Table 1.1 shows that, majority of the participants (78.9%) belonged to the age group of 14-16 years i.e. middle adolescent.

Considering the religion of the participant, more than half of the participants (69.5%) were Hindu. With respect to standard of study, 34.6% were studying in 9th standard.

TABLE 1.2: Frequency and percentage distribution of sociodemographic variables in terms of educational status of father and mother.

Sl.No.	Sociodemographic variables	Frequency(f)	Percentage (%)
4.	Educational status of father		
	No formal Education	11	11.5

	PrimaryEducation(1-7 th std)	29	30.5
	SecondaryEducation(8–10 th std)	22	23.2
	HigherSecondary(PUC)	22	23.2
	Graduation	9	9.5
	Post-graduation	2	2.1
	Others	-	-
5.	Educationalstatusofmother		
	NoformalEducation	20	21.1
	PrimaryEducation(1-7 th std)	20	21.1
	SecondaryEducation(8–10 th std)	31	32.5
	HigherSecondary(PUC)	16	16.8
	Graduation	5	5.3
	Post-graduation	3	3.2
	Others	-	-

Table1.2reveals thatone-third(30.5%)of participants' father completed primary education and around done-third(32.6%)of the mothers had secondary education.

TABLE1.3:Frequency and percentage distribution of sociodemographic variablesin terms of occupation of father and motherandmonthly family income

Sl.No.	Sociodemographicvariables	Frequency(f)	Percentage(%)
6.	Occupation of father		
	Unemployed	2	2.1
	Government employee	6	6.3
	Private employee	26	27.4
	Self-employee	43	45.3
	Daily wages	18	18.9

7.	Occupation of Mother		
	Homemaker	58	61.1
	Government employee	4	4.2
	Private employee	19	20.0
	Self-employee	11	11.5
	Daily wages	3	3.2
8.	Monthly family income		
	Rs. ≤ 10,000	52	54.7
	Rs.10,001-20,000	23	24.2
	Rs.20,001-30,000	11	11.6
	Rs.30,001-40,000	6	6.3
	Rs.>40,000	3	3.2

Table1.3represents, nearly half (45.3%) of participants' father were self-employee whereas more than half (61.1%) participants' mother were home maker. In relation to monthly family income, 54.7% of participants' family income was less than or equal to Rs.10,000.

TABLE1.4:Frequency and percentage distribution of sociodemographic variables in terms of residence, place of stay, type of family and type of diet.

Sl.No.	Sociodemographic variables	Frequency(f)	Percentage(%)
9.	Place of residence		
	Urbanarea	95	100
	Ruralarea	-	-
10.	Placeofstay		
	Home	95	100
	Hostel	-	-
11.	Typeoffamily		
	Nuclearfamily	79	83.2
	Joint family	16	16.8

12.	Type of diet		
	Veg	14	14.7
	Non-veg	81	85.3

Table 1.4 reveals that all the participants (100%) resided in urban area and lived in their own home. Regarding type of family, most (83.2%) of participants belonged to nuclear family and 85.3% of participants preferred non-veg diet. The above figure 1 shows that, 37.9% of adolescent girls were having normal hemoglobin level and classified as normal.

Table 2: Mean and Standard deviation of anemia and body mass index of adolescent girls.

Sl.No.	Variables	Mean	Standard deviation
1.	Anemia (Hemoglobin level)	11.42	1.37
2.	Body mass index	19.19	3.30

The above table 2 shows that mean of anemia (hemoglobin level) and body mass index are 11.42 and 19.19 respectively. Standard deviation of anemia (hemoglobin level) and body mass index of anemia and body mass index are 1.37 and 3.30 respectively.

Table 3: Correlation between anemia and body mass index (BMI) of adolescent girls.

Sl.No.	Variables	Karl Pearson's (r)	p value
1.	Anemia (Hemoglobin level)	0.109	0.293
2.	Body mass index (BMI)		

The above table 3 depicts that there was a weak positive correlation between anemia (hemoglobin level) and body mass index among adolescent girls. But, it was not statistically significant correlation between

anemia and body mass index among adolescent girls at $p > 0.05$. Hence, research hypothesis stated as "there is a significant correlation between anemia and body mass index among adolescent girls" is rejected.

Table 4.0: Association between anemia and selected socio-demographic variables of adolescent girls

Sl.No.	Sociodemographic variables	Hemoglobin level		Chi-square value (χ^2)	P value
		Below median	Above median		
1.	Age			0.516	0.473
	13 years	11	8	df=1	

	□ 14years	37	39	NS	
2.	Religion			0.24	0.877
	Hindu	33	33	df=1	
	Otherreligion	15	14	NS	
3.	Educationalstatusoffather			1.022	0600
	NoformalEducation	6	5	df=2	
	Undergraduation	35	38	NS	
	Abovegraduation	7	4		
4.	Educationalstatusofmother			0.504*	0.777
	NoformalEducation	10	10	df=2	
	Undergraduation	33	34	NS	
	Abovegraduation	5	3		

The above table 4.0 shows that there is no significant association between anemia and selected socio demographic variables at $p > 0.05$. Hence, research hypothesis stated

as "there is a significant association between anemia and selected sociodemographic variables" is rejected.

Table 4.1: Association between anemia and selected socio-demographic variables of adolescent girls

Sl.No.	Sociodemographic variables	Hemoglobin level		Chi-square value (χ^2)	p value
		Below median	Above median		
5.	Occupation of father			0.533	0.466
	Unemployed	0	2	df=1	
	Employed	48	45	NS	
6.	Occupation of mother			1.286	0.257
	Homemaker	32	26	df=1	
	Working mother	16	21	NS	
7.	Monthly family income			5.645	0.018
	□ 20,000	32	41	df=1	
	>20,000	16	6	S□	
8.	Type of family			0.640	0.424
	Nuclear family	39	41	df=1	

	Joint family	9	6	NS	
9.	Type of diet			0.731	0.393
	Veg	8	5	df=1	
	Non-veg	40	42	NS	

The above table 4.1 shows that there is no significant association between anemia and selected socio demographic variables at $p > 0.05$ except for monthly family income at $p = 0.018$.

Hence, research hypothesis stated as "there is a significant association between anemia and selected socio demographic variables" is rejected except for monthly family income.

Table 4.2: Association between anemia and selected socio-demographic variables of adolescent girls

Sl.No.	Socio demographic variables	Hemoglobin level		Chi-square value (χ^2)	p value
		Below median	Above median		
10.	Do you eat junk food?			0.114	0.735
	No	4	4	df=1	
	Yes	44	43	NS	
11.	Total number of children in the family			0.255	0.614
	≤ 2	32	29	df=1	
	> 2	16	18	NS	
12.	Birth order of child in the family			2.450	0.294
	First child	21	28		
	Second child	16	12		
	Third child and more	11	7		
13.	Attainment to menarche			0.240	0.625
	No	2	2	df=1	
	Yes	46	45	NS	

The above table 4.2 shows that there is no significant association between anemia and selected socio demographic variables at $p > 0.05$. Hence, research hypothesis stated as "there is a significant association between anemia and selected socio demographic variables" is rejected.

Table5.0:Association between body mass index and selected sociodemographic variables

Sl.No.	Sociodemographic variables	BodyMassIndex(BMI)value		Chi-square value(χ^2)	P value
		Below median	Above median		
1.	Age			0.042	0.837
	□ 13years	10	9	df=1	
	□ 14years	38	38	NS	
2.	Religion			1.397	0.237
	Hindu	36	30	df=1	
	Other religion	12	17	NS	
3.	Educational status of father			1.969	0.374
	No formal Education	7	4	df=2	
	Undergraduation	34	39	NS	
	Above graduation	7	4		
4.	Educational status of mother			2.205*	0.332
	No formal Education	9	11	df=2	
	Undergraduation	33	34	NS	
	Above graduation	6	2		

The above table 5.0 shows that there is no significant association between body mass index and selected sociodemographic variables at $p > 0.05$. Hence, research hypothesis stated

as "there is a significant association between body mass index and selected sociodemographic variables" is rejected.

Table5.1:Association between body mass index and selected sociodemographic variables

Sl.No.	Sociodemographic variables	Body mass index value		Chi-square value(χ^2)	p value
		Below median	Above median		
5.	Occupation of father			0.001	0.988
	Unemployed	1	1	df=1	
	Employed	47	46	NS	
6.	Occupation of mother			0.302	0.583

	Homemaker	28	30	df=1 NS	
	Workingmother	20	17		
7.	Monthlyfamilyincome			2.297	0.130
	□ 20,000	40	33	df=1 NS	
	>20,000	8	14		
8.	Typeoffamily			2.106	0.147
	Nuclearfamily	43	37	df=1 NS	
	Joint family	5	10		
9.	Typeof diet			0.349	0.349
	Veg	5	8	df=1 NS	
	Non-veg	43	39		

iablesatp>0.05.Hence,researchhypothesis stated as "there is a significant association between body mass index andselectedsocio demographic variables"is rejected.

The above table 5.1 depicts that there is no significant association between bodymassindexandselectedsociodemographicvar

Table5.2:Associationbetweenbodymassindexandselectedsociodemographicvariables

Sl.No.	Sociodemographic variables	Bodymassindexvalue		Chi-squarevalue(χ^2)	p value
		Below median	Above median		
10.	Doyou eatjunk food?			0.001	0.975
	No	4	4	df=1 NS	
	Yes	44	47		
11.	Totalnumberof childreninthefamily			0.870	0.351
	□ 2	33	28	df=1 NS	
	>2	15	19		
12.	Birthorderof childinthefamily			1.205	0.547
	Firstchild	26	23	df=2 NS	
	Secondchild	15	13		
	Thirdchildandmore	7	11		
13.	Attainmentofmenarche			1.001	0.317

No	3	1	df=1 NS
Yes	45	46	

The above table 5.2 shows that there is no significant association between body mass index and selected sociodemographic variables at $p > 0.05$. Hence, research hypothesis stated as "there is a significant association between body mass index and selected socio demographic variables" is rejected.

DISCUSSION

Prevalence of anemia and assessment of body mass index:

In the present study, nearly more than half (62.1%) of adolescent girls were anemic. The findings of the study were supported by study conducted by Siddharam S M [Andhra Pradesh, 2011] which found that the prevalence of anemia was 45.2%.³²

In this study, 75.8% were having normal body mass index (BMI) whereas 2.1% were severe thin, 12.6% were thin, 8.4% were overweight and 1.1% obese. where 72.6% of adolescent girls have normal range of BMI, 6.6% were very thin, 15% were thin, 4.8% were overweight and 1.1% were obese.⁵⁷

This indicated the importance of including adolescent girls in the risk age group to improve their iron status and the need for planning intervention programs that would increase the hemoglobin levels among the adolescent girls through prophylaxis treatment and dietary modifications.

Relation between anemia and body mass index (BMI):

In the present study, the results of correlation analysis showed that there was a weak positive correlation between anemia and body mass index ($r = 0.109$) but not statistically significant ($p = 0.293$). Hence, **the research hypothesis stated as 'there is a significant correlation between anemia and body mass**

index of adolescent girls' is rejected. However, the result of the present study is contradicted to the study conducted by Pauline S [New Delhi, 2017] which found that there was a mild positive correlation between anemia and body mass index ($r = 0.127$) and statistically significant at $p < 0.001$.¹¹

Association between the study findings with selected sociodemographic variables:

In this study, there was statistically significant association between anemia with selected socio-demographic variables i.e. monthly family income ($\chi^2 = 5.645$, $p = 0.018$). Hence, research hypothesis stated as **'there is a significant association between anemia and selected sociodemographic variables'** is rejected except for monthly family income. This result is similar to the study conducted by Upadhye J.V [Nagpur, 2017] where there was a significant association between anemia and socio-economic status ($\chi^2 = 26.85$, $p = 0.0000014$).¹²

In the present study, there was no association between body mass index with selected socio-demographic variables. Hence, research hypothesis stated as **'there is a significant association between body mass index and selected socio demographic variables'** is rejected. But the result is discordant with the study conducted by Choudhary K, et al. [Rajasthan, 2014] where body mass index was statistically significantly

associated with age ($\chi^2 = 117.4$, $p = 0.0001$).¹³

CONCLUSION

In the current study, more than half and nearly one fourth of adolescent girls were anemic and malnourished respectively. Hence, efforts are needed to prevent anemia and malnutrition.

When adolescent girls enter pregnancy with adequate iron reserves and iron supplements which will be efficient at improving the iron status of the mother and fetus. As a result, the risk of maternal anemia and anemia in early

infancy will be reduced and intergenerational cycle of malnutrition can be effectively broken.

LIMITATIONS

The author is thankful to Department of Paediatric Nursing for providing all the facilities to carry out this work

Conflict of Interest

None

Financial Support

Nil

- In this study, clinical signs of anemia and poor nutritional pattern was not assessed among adolescent girls.
- Only two schools were taken for screening which does not give a true representation of all adolescent girls in Andhra Pradesh.
- Authenticity of the information is based on the response of the adolescent girls.

ACKNOWLEDGMENT

REFERENCES

1. Steinberg L. Age of opportunity: lessons from the neuroscience of adolescence. Boston MA: Houghton Mifflin Harcourt. 2014
2. The reproductive health of adolescents: a strategy for action/a joint WHO/UNFPA/UNICEF statement. WHO/UNFPA/UNICEF [Internet]. 1989 [cited 2017 Jan 24]. Available from: http://apps.who.int/iris/bitstream/10665/393061/1/9241561254_eng.pdf
3. Adolescent nutrition at a glance; available from: <http://web.worldbank.org/archive/website01213/WEB/0CO-82.HTM>
4. Kollur R.L, Pratinidhi A.K, Kakade S.V. Nutritional status of adolescent girls from a community in Maharashtra: a cross-sectional study. Int J Med Sci Public Health [Internet]. 2014 [cited 2017 Jan 5]; 3(8):951-54. Available from: <http://www.scopemed.org/?mno=158519>
5. WHO. Available from: <http://www.who.int/topics/anaemia/en/>
6. Hockenberry M.J, Wilson D. Essential of Pediatric Nursing. 1st South Asia ed.; 2015
7. National Cancer Institute. Available from: <https://www.cancer.gov/publications/dictionaries/cancer-terms/def/hemoglobin>
8. Ramachandran P. Standards for diagnosis of anemia. Available from: http://nutritionfoundationofindia.org/PPT-2011/PPT-21/Dr_Prema.pdf
9. WHO. Chan M. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Geneva, Switzerland: World Health Organization; 2011
10. Teji K, Dessie Y, Assebe T, Abdo M. Anemia and nutritional status of adolescent girls in Babile District, Eastern Ethiopia. PAMJ [Internet]. 2016 [cited 2016 Jan 10]; 24(64): 1-10.
11. Pauline S, Kumar R.S. Correlation between prevalence of anemia and body mass index among adolescent girls. International Journal of science and research (IJSR). 2015 Nov; 6(11): 320-23.
12. Upadhye J.V, Upadhye J.J.

Availa

Assessment of anemia in adolescent
girls. Int. J RepordContraceptObstet

Gynecol. June2017; 6(7): 3113-17.