Anemia among Adolescent girls in India: A review of literature

Ms. Pabalpreet Kaur[★,†,1], Dr. (Mrs.) Jyoti Sarin[2]

[1] *Nursing Tutor, M.M College of Nursing, Mullana*
[2] *Director- Principal, M.M College of Nursing, Mullana*

Reviewed By: Dr.
Daniel V.
Department: Medical

ABSTRACT

Anemia is a major public health problem worldwide and is often ignored in developing countries. Adolescents constitute one of the vulnerable groups of anemia. Anemia at this stage can contribute to impaired physical, psychological and cognitive development, poor school performance and further in pregnancy leads to Increases maternal mortality and preterm and low birth babies. A systematic review was undertaken to find out the prevalence of anemia among adolescent girls from 2011-2019 in India.

Method:

A review of all published literature related to prevalence of anemia for a period of 9 years (2011-2019) in India was carried out. The online database MEDLINE, Science direct, Pubmed, Google scholar was used to identify relevant studies. Data from studies meeting inclusion/exclusion criteria were abstracted.

Results:

After assessing the quality of the full texts of potentially 35 relevant studies, 15 studies with a total of 5,691 adolescent girls were included in the review. The review included Descriptive and cross-sectional studies from different states of India. In all studies, prevalence estimated anemia ranged from 21% to 90%. In terms of severity of anemia mild anemia ranges from 18.4% to 73.3% and moderate and severe anemia 19.% to 55.35%, 0.43% to 15.6% respectively.

Conclusion:

The available evidence suggests that anemia contributes substantially to the health of adolescent girls even today. Present review found that prevalence of anemia in India is still persisting. The review showed that anemia results from inadequate intake of iron in diet, worm infestation, low BMI, not taking Iron and folic acid tablets, low-socioeconomic status.

Key words: Anemia–India–Prevalence–Adolescent Girls

1   INTRODUCTION

Anemia is one of the commonest nutritional deficiencies widespread in every region of world. Although it occurs in all the age group, but found to be more prevalent among women in reproductive age including adolescent girls. As per World Health Organization (WHO) adolescent period range from 10-19 years of age.[1] This period is considered to be a influential phase as transition from childhood to adulthood takes place during this time along with major physiological, psychological and behavioral changes and for this rapid growth the need for extra nutrients also increases.

According to recent statistics, World's population constitute of about 1.2 billion adolescents which make up 16% of world's population. More than half of all adolescents globally live in Asian continent. South Asia is home to nearly 350 million adolescents worldwide. 21% of Indian population consists of adolescents.[2]

Women in general are more vulnerable to anemia than males because of less iron store and the onset of menstruation. To compensate the menstrual blood loss it's important to increase the additional requirement of Iron in diet and by consumption of iron and folic acid tablets. In India, the highest prevalence of anemia is reported among adolescent

★   Corresponding author.
†   Email: pabalpreet@gmail.com

girls of 12-13 years of age, the average age for menarche. Diet deficient from all the important macro and micro nutrients combined with menstrual losses put adolescent girls to be at greater risk of Iron deficiency anemia as compared to boys.[8]

An adolescent girl with anemia enters the reproductive age and becomes pregnant will be at higher risk of giving birth to a preterm, low birth weight baby , who might have low iron store. Factors like inadequate complementary feeding practices put that child at a risk of anemia during childhood period. That child with low iron store will enters into adolescence. Thus this vicious cycle of iron deficiency anemia continues. It is very much important to break the inter-generational cycle of anemia at this stage.[3]

Anemia is multi-factorial in nature. The main cause of Nutritional anemia is iron deficiency which can be due to Insufficient quantity of iron-rich foods and foods rich in vitamin C, such as citrus fruits which increases the absorption of Iron, excessive intake of Tea, Coffee and calcium rich food during meal time as it hinders in the absorption of iron.[4] Other cause contributing towards anemia can be iron loss during menstruation, infections like malaria, intestinal worms, poor environmental sanitation, unsafe drinking water and inadequate personal hygiene, walking bare foot.

Anemia has very deleterious effect on health if it persists in adolescent and pregnancy. It can deteriorate the physical growth of girls and has negative effects on reproductive development. Girls may feel more lethargic in performing day to day activity. It will decrease the physical work capacity and cognition impairment. The major consequences of anemia in pregnancy are maternal mortality and morbidity as well as low birth weight leading to increased infant mortality.

To decrease the prevalence of anemia to some extend community participation plays a vital role by imparting health education and awareness among the community. Efforts to combat anemia was initiated years ago when in1970 National Nutritional Anemia Prophylaxis Programme was started. It was focused to improve the nutritional anemia by providing daily dose of Iron and Folic acid supplementation among "at risk" population that include pregnant and lactating mothers, women in reproductive age and children below 12 years of age. In 2000, UNICEF Initiated a Pilot project to Control anemia among Adolescent girls in 20 districts of 5 states with a strategy of weekly IFA supplementation and biannual de-worming called as weekly iron and folic acid supplementation (WIFS). In the year 2012, this was universalized over whole India to meet the challenge of high prevalence and incidence of anemia amongst adolescent girls and boys.[5] National Iron plus initiative launched in 2013, to prevent and control iron deficiency in India. Now a days, National Nutrition Mission (Poshan abhiyan) that was initiated on 8th March 2018 Jhunjhunu in Rajasthan is a 1000 days intensified nutritional Programme for Under five children, Adolescent girls and pregnant and nursing mothers. Anemia control is one of the important theme under this mission along with optimal breastfeeding (early and exclusive), complementary feeding, diet, hygiene and sanitation, eating healthy - food fortification.[6]

Despite these initiatives, anemia continues to be a major challenge. The aim of the review was to identify the prevalence of anemia in India from 2011-2019.

2   MATERIALS AND METHODS

Data sources and search strategy

An electronic literature search of the MEDLINE, Science direct, Pubmed, Google scholar was used to identify relevant studies from 2011- 2019. The medical subject handing terms (MeSH) and free text terms such as anemia, prevalence, adolescent girls, India, hemoglobin, risk factors were used to search.
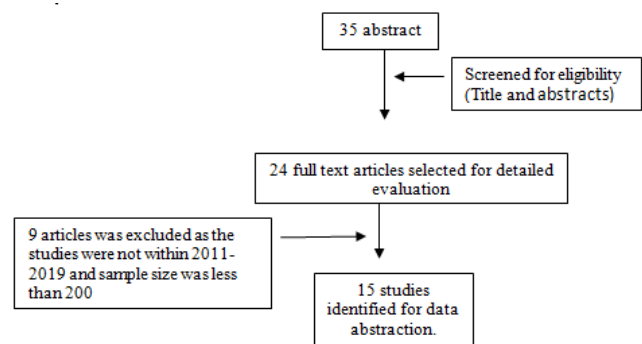

Figure 1. The literature search

Inclusion Criteria

We identified studies from the peer-reviewed journals that used descriptive, cross-sectional research methodologies. The studies were limited to publication in the recent 9 years related to prevalence of anemia in India. Studies with small group (less than 200 women) were excluded. All the studies were reviewed by all the authors. And, the studies that met the inclusion criteria were finalized and included for review. Out of 35 articles 15 potentially relevant articles were retrieved (Flow Chart 1). All the studies were focused on laboratory results (Hb). In all these studies, anemia was classified according to the World Health Organization (WHO) classification for Adolescent girls, i.e. below 12 gm/dl.

3   RESULTS:

After assessing the quality of the full texts of potentially relevant studies, 15 studies with a total of 5,691 adolescent girls were included in the review. The review included Descriptive and cross-sectional studies from different states of India. The detailed information of the included studies has been shown in Table 2. In all studies, prevalence estimated anemia ranged from 21% to 90%. In terms of severity of anemia mild anemia ranges from 18.4% to 73.3% and moderate and severe anemia 19.% to 55.35%, 0.43% to 15.6% respectively.

A cross-sectional study was conducted among 257 adolescent girls of Ettumanoor panchayat, Kottayam. The preva-

Table 1. Detailed characteristics of 15 articles included in the review

S.no	Author	Sample size	Method	Setting	Findings (Prevalence of Anemia)			
					Overall	Mild Anemia	Moderate Anemia	Severe Anemia
1.	Chandrakumari AS et al. (2019)	255	Descriptive study	Rural area of Tamil Nadu, India	48.63%	55.64%	33.87%	10.48%
2.	Rekha Kumari et al (2017)	200	Cross –sectional study	Medical outpatient department or emergency of IGIMS, Patna	50%	43.3%	3.3%	3.3%
3.	P.M. Siva, et al (2016)	257	Cross-sectional study	Ettumanoor panchayat, the field practice area of Government Medical College, Kottayam.	21%	19.1%	1.9%	-
4.	Goyal N, et al (2018)	770	Cross-sectional descriptive study	Schools of Haldwani, Uttarakhand, India	49.2%	34.53%	10.13%	3.52%
5.	Deshpande NS et al (2013)	1000	Descriptive study	500 girls were from Marathi medium school, and the remaining 500 were from English medium school.	60%	18.4%	41.3%	0.4%
6.	Arya AK et al (2017)	400	Community-based cross-sectional study	Slum area of Kanpur, Uttar Pradesh.	78.5%	40%	33%	5.5%
7.	Kaur T et al (2015)	250	Descriptive study	Rural areas of district Karnal, Haryana, India.	88%	21.2%	51.2%	15.6%
8.	Shanti Devi et al (2015)	320	Descriptive study	Government Secondary Schools of district Rohtak (Haryana)	73%	54%	18%	1%
9.	Premalatha T et al (2012)	400	cross-sectional survey	School girls of private and government schools Chennai	78.75%	37.5%	35%	6%
10.	Jayant V et al 2017)	300	cross-sectional survey	School	90%	73.3%	16.6%	-
11.	Vineeta Gupta et al (2017)	232	Descriptive study	Scondary schools of in rural Rajnandgaon, Chhattisgharh.	76.29%	50.86%	25%	0.43%
12.	Rati S et al (2014)	300	Descriptive study	Schools at Nidoni, Babaleshwar PHC Bijapur	80%	48.75%	42.5%	8.75%
13.	C. Anandi et al (2017)	428	cross sectional observational study	Government medical college hospital of Salem district	84.3%	68.6%	30%	1%
14.	Mohan Shinde et al (2015)	267	cross-sectional	Urban health training center, community medicine department, Gandhi Medical College, Bhopal	52.06%	36.7%	14.6%	0.7%
15.	Shweta R. Chapparbandi et al (2016)	312	Cross- sectional	Rural field practice area Hebbal of Department of Community Medicine, M. R. Medical College, Gulbarga, Karnataka.	65.2%	4.09%	55.35%	4.72%

lence of anemia was 21% out of which majority of them 19.1% had mild anemia. The major risk factors found to be significantly associated with anemia were presence of ova in stool and number of pads usage per day during menstruation. Protective factors were personal hygienic practices including hand washing before food intake, hand washing after toileting and usage of foot wear and Jaggery intake.[9] A cross-sectional study was done in Rural Tamil Nadu on 255 adolescent girls. Overall prevalence of anemia was found to be 48.63%. Prevalence of anemia (52.24%) was high among the late adolescents (15-19 years) as compared to the early adolescents (10-14 years) which was found to be statistically significant. The prevalence of anemia was found to be high (70.59%) among the girls who belonged to low socio-economic class which was statistically significant.[7]

A Cross-sectional study for a period of six months (April 2015-October 2015) was done in Indira Gandhi Institute of Medical Sciences, Patna, Bihar on 200 girls. Prevalence of anemia was found to be 50%. Prevalence was higher (53%) among early adolescent girls (10-14 years) than girls in late adolescent (47%).[8] A cross-sectional descriptive study was carried out among 770 adolescent girls studying in schools of Haldwani, Uttarakhand, India. Less than half (49.2%) girls were Anemic. Place of residence (urban areas), type of school (Government schools), birth order, type of family and mother occupation were significantly associated with presence of anemia. Girls taking mixed diet were 1.23 times more likely to be non-anemic as compared to girls taking

vegetarian diet. Study showed adolescent girls consuming IFA tablets were less likely anemic compared to those not consuming (OR=0.09, p<0.001).[10] School based Descriptive study in 2 schools, of Pune, Maharashtra, India was conducted on 1000 adolescent girls. 60 percent of girls were found to be anemic. High prevalence of anemia was reported among adolescent girls belonging to class III, IV, V as per modified kuppuswamy classification. Thin and severely thin adolescent girls were found to be at higher risk of anaemia.[11]

A community-based cross-sectional study was carried out among 400 adolescent girls (10-19 years) in a slum area of Kanpur, Uttar Pradesh from June 2015 to May 2016. The prevalence of anemia among adolescent girls was found to be 78.5%, Anemia was significantly higher among the adolescent girls whose mothers were either illiterate or having only primary education and those belonging to lower socioeconomic status. Age-wise distribution showed that the prevalence of anemia was more in middle (79.4%) and late adolescent girls (82.6%) compared to early adolescent girls (75.6%) but the association was not statistically significant.[12] A descriptive study on Two hundred fifty rural school going adolescent girls (13-15 yrs.) of low socio economic background were randomly selected from rural areas of district Karnal, Haryana, India. 88% of girls were anemic. Most of the girls (53.18%) were vegetarian and one half of the respondents were consuming two meals per day. Only one third of the subjects were in the habit of taking packed lunch in routine and maximum respondents (73.63%) were in the habit of keeping fast. Skipping of meals was common among three fourth of the subjects.[13]

A cross-sectional survey was executed among 400 female school students in the age group of 13-17 years in Chennai. The prevalence of anemia was found to be 78.75% among school students. Chi-square statistics shows significant association (p<0.05) of anemia is with type of family, socioeconomic status and diet. In this study 42.5% of girls with BMI<18 were found to be anemic.[15] A cross-sectional survey was conducted in an urban area in a school. A total of 300 girls (12-18 years) were included in this study. The prevalence of anemia was found to be 90%. A significant association of anemia was found with socioeconomic status and literacy status of parents. Mean height and weight of subjects with anemia was significantly less than subjects without anemia. A high prevalence of anemia among adolescent females was found, among those whose parents were less educated.[16]

A cross sectional observational study was conducted at the government medical college hospital of Salem district for a period of one year (March 2016 to Feb 2017) among the adolescent girls in the age group of 13 to 19 years attending the out-patient clinic. A total of 428 adolescent girls were screened for anemia. Out of 428 adolescent girls 361 (84.3%) were found to be anemic. Parent's educational status, socioeconomic status, total number of siblings, menarche, increased menstrual flow and passing of intestinal worms were the factors which had influenced anemia in the study subjects.[19] A cross-sectional study was conducted on 267 school going girls between the ages of 11 and 19 years in Bhopal.

The overall prevalence of anemia among adolescent girls was found to be 52.06%. The statistical association of anemia was found with the socio-economic status of the subjects. The mean height and mean weight of subjects with anemia is less as compared with subjects without anemia. Prevalence of anemia was found higher in middle adolescence (14-16 years).[20]

4   DISCUSSION:

Even after decades of implementing anemia control program in country, the magnitude of problem remains the same. Severe anemia in adolescent girls believed to increase the risk of maternal mortality in childbirth. In this review, we tried to assess the prevalence of anemia in adolescent girls by analyzing the available studies from 20011 to 2019. The prevalence in present review found to be 21% to 90% and severe anemia from 0.43% to 15.6% respectively. This large range of prevalence can be due to different geographical area, lifestyle and literacy factors.

Lower socio-economic status, mostly among Lower class, Mothers educational status especially in non-literate and having primary education, less BMI, Diet pattern more among mixed diet as compared to vegetarians as vegetables are good source of iron, type of family, Number of siblings, worms in stool were found to be significantly associated with anemia.[7−20]

The prevalence and severity of anemia was higher among middle adolescent (14-16 years) as compared to late and early adolescent periods.[8,12,17]

MAJOR CHALLENGES FACED

India was the first developing country to take up the national nutritional prophylaxis program among the South Asian countries of iron folic acid supplementation to prevent anemia among adolescent girls along with pregnant women and children. Screening for anemia at early stage and iron-folic acid supplementation therapy along with community awareness and full participation for the prevention and management of anemia in these vulnerable groups has been incorporated as an essential component in many health programmes that include RCH-I (Reproductive and Child Health-1), RCH-II, Weekly Iron Folic acid supplementation programmes (WIFS), National Iron Plus Initiative (NIPI). In spite of all these programs the countries still face a challenge to tackle this problem. The One reason could be failure to monitor and evaluate the supplementation of the program. The countries which could strictly monitor and evaluate have shown decline in the prevalence of anemia.[22] Secondly, Inadequate Information, Education and Communication (IEC) activities. Countries who adopted the strategies to bring about a behavioral change through effective information counseling sessions have shown successful decline. Moreover, health sector has given importance to Non-Communicable diseases and other emerging health problems, hence anemia has remained a silent disease affecting women and children of reproductive age.

The etiology of iron deficiency anemia remained same over the decades. Poor dietary habits, Low socioeconomic

status and Lack of awareness, unhealthy dietary practices, and worm infestation are all factors which affect its incidence and severity. The scenario from the literature searched for the last 9 years have shown high prevalence of anemia in some states if India. Although some progress has been made over a period of time, but much more needs to be done to develop technical expertise and capacity building, establish quality standards ,provide adequate supplies of drug and Hb estimation kits , training of peripheral community workers and provide continuous supervision. Focus on providing appropriate information, education and counseling should be done.

Despite the availability and easy access to medical care, high prevalence of anemia still prevalent indicates the level of ignorance and indifference to health needs. There is an urgent need to educate adolescent girls and their families about the importance of healthy diet, Consumption of iron folic acid tablets and biannually Albendazole tablet.

IMPLICATION

Anemia remains to be a problem with multi-factorial causes. Intervention with only iron and folic supplements is not adequate to tackle this problem. Therefore, there is a need to use multiple interventions for addressing anemia. Interventions to improve the hemoglobin of adolescent girls should be used like Food fortification with Iron and folic acid, and nutrition education to improve dietary intake. Government has to take step to improve quality of services by intensifying public education and community participation to promote the use of health services and healthy behaviors for adhering to the prescribed program in order to achieve the best result.

LIMITATIONS OF THE REVIEW

All the studies selected were published between the years 2011 and 2019. There were few papers only 15 studies were available for the review and hence generalization may be difficult. The studies reviewed could not cover all the states of India as recently published studies (20011-2019) were not available.

5   CONCLUSION

The available evidence suggests that anemia contributes substantially to the health of adolescent girls even today. Fifteen studies published between year 20011 and 2019 found that anemia prevalence in India is still persisting. The estimated prevalence of anemia ranged from 21 to 90%. The review showed that anemia results from inadequate intake of iron in diet, worm infestation, low BMI, not taking Iron and folic acid tablets. Moreover, the India is facing challenges in improving the socioeconomic status, educational level and health behavior modifications.

REFERENCES

[1] Organization W. Adolescence: a period needing special attention - recognizing-adolescence [Internet]. Apps.who.int. [cited 21 April 2020]. Available from: https://apps.who.int/adolescent/second-decade/section2/page1/recognizing-adolescence.html

2. Adolescent Demographics - UNICEF DATA [Internet]. UNICEF DATA. 2020 [cited 21 April 2020]. Available from: https://data.unicef.org/topic/adolescents/demographics/

3. Techinical handbook on anemia.[Internet]. Nhm.gov.in. [cited 21 April 2020]. Available from:https://www.nhm.gov.in/images/pdf/programmes/wifs/guidelines/technical_handbook_on_anaemia.pdf

4. Noronha JA, Al Khasawneh E, Seshan V, Ramasubramaniam S, Raman S. Anemia in Pregnancy— Consequences and Challenges: A Review of Literature. J South Asian Feder Obst Gynae 2012;4(1):64-70.

5. Dureja D. Weekly Iron and Folic Acid Supplementation Program for Adolescents in India [Internet]. Spring-nutrition.org. [cited 21 April 2020]. Available from: https://www.springnutrition.org/sites/default/files/events/wifs_webinar_dr._dureja_23042016_f.pdf

6. TRANSFORMING NUTRITION IN INDIA: POSHAN ABHIYAAN A PROGRESS REPORT DECEMBER 2018 [Internet]. Niti.gov.in. 2018 [cited 21 April 2020]. Available from: https://niti.gov.in/sites/default/files/2020-02/POSHAN_Abhiyaan_first_progress_report_6_Feb_2019.pdf

7. Chandrakumari AS, Sinha P, Singaravelu S, Jaikumar S. Prevalence of anemia among adolescent girls in a rural area of Tamil Nadu, India. J Family Med Prim Care [serial online] 2019 [cited 2020 Apr 7];8:1414-7. Available from: http://www.jfmpc.com/text.asp?2019/8/4/1414/257069

8. Rekha Kumari, Raushan Kumar Bharti, Kalpana Singh, Archana Sinha, Sudhir Kumar, Anand Saran, Uday Kumar.J Clin Diagn Res. 2017 Aug; 11(8): BC04–BC06. Published online 2017 Aug 1. doi: 10.7860/JCDR/2017/26163.10325

9. P.M. Siva, A. Sobha, V.D. Manjula.J Clin Diagn Res. 2016 Nov; 10(11): LC19–LC23. Published online 2016 Nov 1. doi: 10.7860/JCDR/2016/20939.8938

10. Goyal N, Rawat C. A study of anaemia and its correlates among adolescent girls in schools of Haldwani, India. International Journal of Research in Medical Sciences. 2018;6(10):3320.

11. Deshpande NS, Karva D, Agarkhedkar S, Deshpande S. Prevalence of anemia in adolescent girls and its co-relation with demographic factors. International Journal of Medicine and Public Health. 2013;3(4):235-239.

12. Arya AK, Lal P, Kumar N, Barman S. Prevalence of anemia among adolescent girls in an urban slum of Kanpur, Uttar Pradesh. Int J Med Sci Public Health 2017;6(9):1378-1381.

13. Kaur T, Kaur M. Anaemia a Health Burden among Rural Adolescent Girls in District Karnal: Prevalence and Coorelates [Internet]. Isca.in. 2015 [cited 7 April 2020]. Available from: http://www.isca.in/IJBS/Archive/v4/i7/8.ISCA-IRJBS-2015-080.pdf

14. Devi S, Deswal V, verma R. PREVALENCE OF ANEMIA AMONG ADOLESCENT GIRLS: A SCHOOL BASED STUDY. International Journal of Basic and Applied Medical Sciences [Internet]. 2015 [cited 7 April 2020];5(1):95-98. Available from: http://www.cibtech.org/J-MEDICAL-SCIENCES/PUBLICATIONS/2015/Vol_5_No_1/17-JMS-016-SURAJ-PREVALENCE-STUDY.pdf

15. Premalatha T, Valarmathi S, Srijayanth P, Sundar JS, Kalpana S (2012) Prevalence of Anemia and its Associated Factors among Adolescent School Girls in Chennai, Tamil Nadu, INDIA. epidemiol 2:118.doi:10.4172/2161-1165.1000118

16. Upadhye JV, Upadhye JJ. Assessment of anaemia in adolescent girls. Int J Reprod Contracept Obstet Gynecol 2017;6:3113-7.

17. Gupta D. Prevalence of Anemia among Adolescent Girls in Rural Population of Rajnandgaon, Chhattisgharh, India. Journal of Medical Science And clinical Research. 2017;05(02):17369-17374.

18. mRati S, Jawadagi S. International Journal of Science and Research (IJSR). International Journal of Science and Research (IJSR) [Internet]. 2014 [cited 7 April 2020];3(8):1237-1242. Available from: https://pdfs.semanticscholar.org/09d3/2d5e238d62412a550f4801d03f2a00d46c6d.

19.,C. Anandi. Yoganandh. Prevalence and factors influencing anaemia among adolescent females in rural area of South India. Indian Journal of Basic and Applied Medical Research [Internet]. 2017 [cited 7 April 2020];6(3):258-265.

Available from: https://ijbamr.com/pdf/June%202017%20258-265.pdf.pdf

20. Mohan Shinde, Anita Shinde, Ashok Shrivastava. "Prevalence of Anemia among Adolescent Girls in Urban Area of Central Madhya Pradesh". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 56, July 13; Page: 9750-9754, DOI: 10.14260/jemds/2015/1407 Chapparbandi SR, Nigudgi SR.
21. Prevalence of anemia among adolescent girls residing in rural field practice area of M. R. Medical College, Kalaburagi, Karnataka, India: a cross-sectional study. Int J Community Med Public Health 2016;3:2161-3.
22. Rush D. Nutrition and maternal mortality in the developing World. American Journal of Clinical Nutrition 2000;72(1):2125-240s.

AUTHOR BIOGRAPHY

Ms. Pabalpreet Kaur Nursing Tutor, M.M College of Nursing, Mullana

Dr. (Mrs.) Jyoti Sarin Director- Principal, M.M College of Nursing, Mullana