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*RESEARCH ARTICLE*

# COMPARISON OF FERROUS SULPHATE WITH COLLOIDAL IRON IN THE TREATMENT OF IRON DEFICIENCY ANEMIA IN CHILDREN

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## Abstract

**Background**: Anemia is a major health problem throughout the world andchildren under 5 years of age are at highest risk. Nutritional deficiency isthe mostcommoncauseofanemiainchildrenunder2yearsofageduetohighrateofgrowthandincreaseddemandofiron,vitaminB12andfolicacid.According to WHO, 1 out of every 2 pre-school children are suffering from IDA indevelopingcountries. Different oral iron preparations are available totreatIDA.Hence, this study was done to compare the therapeutic efficacy andside effects offerroussulphatewithcolloidaliron inthetreatmentofIDAinchildren.

***Objectives:***

1. Tocomparethetherapeuticefficacyofferroussulphatewithcolloidal ironinthetreatmentofIDAinchildrenaged6monthsto18years.
2. Tocomparethesideeffectsbetweenthetwogroups.

**Methods:** This randomizedcontrol study was conducted in MVJ medicalcollegeandresearchhospital,Hoskote,Bangalore.Eligiblechildrenwererandomized to 2 groups. Group A consisting of 75 children were given ferroussulphateinadoseof3mg/kg/dayofelementalirononcedailyfor4weeks.GroupBconsistingof75childrenweregivencolloidalironinadoseof 3mg/kg/dayof elemental iron once daily for 4 weeks. Reticulocyte countbetween the twogroupswas checked at the end of one week and haemoglobinat the end of onemonth. Side effects and compliance of the two ironformulations were checked onfollowup.

**Results:** The mean rise in the reticulocyte count at the end of 1 week is higherincolloidalironincomparisontoferroussulphategroup.Themeanriseinhaemoglobin at the end of one month is more in colloidal iron compared to ferroussulphate group, however the difference is not statistically significant. Compliancewith colloidal iron is better than ferrous sulphate group, as nausea is comparativelymorewithferroussulphategroupwhichattributedtodecreasedcompliancewhichisstatisticallysignificant.

**Conclusion**: Colloidal iron and ferrous sulphate are found to be equallyefficacious in thetreatment of iron deficiency anemia. However, owing to its goodcompliance and lesser GI side effects,

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colloidal iron is found to bepreferable overferroussulphate. Hence, the study suggests the use of colloidal iron to treat IDA in children between 6 months to 18 years.



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## Introduction:-

Anemiaisamajorhealthproblemthroughouttheworldandchildrenunder5yearsofage are at highest risk. Anemia is defined as a haemoglobin level that is twostandard deviations below the mean for age and sex.According to WHO, 1 out of every 2 pre school children are suffering from IDA indevelopingcountries.InIndiaintheyear2019,58.5%ofchildrenintheagegroupof 6-59monthshadIDA.Oral iron preparations are available in the form of ferrous and ferric salts.

Ferricformsarepoorlysolubleinacidicmedium.Variousferroussaltsavailableareferrous Sulphate(hydratedsalt20%,driedsalt32%iron),ferrousascorbate (14% iron), ferrous gluconate (12% iron), ferrous fumarate (33% iron).Absorptionfromchelatedironisfourtimes higherthanferroussulfate. Colloidal iron has more iron content than ferrous salt and better tolerability withlesser side effects but rise of hemoglobin with it is still not assured. It is very muchimportanttotreatanemiawitheffectivedrugtopreventseriesofeventsoccurringdueto it . Ferrous sulphateandcolloidal iron formulations havebeen widelyused in thetreatmentof irondeficiencyanemiaduetoitshigheffectivenessandeasyavailability.

As there is paucity of studies directly comparing ferrous sulphate andcolloidal ironin pediatric age group, this study was undertaken with theaim to compare oralferrous sulfate and colloidal iron in the treatmentof iron deficiency anemia in termsofsafety andefficacy.

## Aims And Objectives:-

1. Tocomparethetherapeuticefficacyofferroussulphatewithcolloidaliroincontainingferrichydroxideinthetr eatmentofirondeficiencyanemiainchildrenaged6monthsto18years.
2. Tocomparethesideeffectsbetweenthe2groups.

## Research Methodology:-

Patientsbetweentheagegroupof6monthsto18yearswhovisitedMVJMCandRHon OPD basis or whowere admitted at MVJMC and RH, diagnosed with irondeficiency anemia based on clinical presentation andlaboratory findings ( completebloodcount)weretakenupforthestudy.A total of 150 cases were taken up forthe study . A detailed history including thebirthhistoryandfeedinghistorywasnoted.Eligible childrenwerrandomizedto2groupsusingcomputergeneratedtableofrandomnumber.GroupAwasgivenferrou ssulphateatadoseof3mg/kg/dayofelementalirononcedailyfor4weeksorallyinsyrupform.

Group B was given colloidal iron containing ferric hydroxide at a dose of 3mg/kg/dayofelementalirononcedailyfor4weeksorallyinsyrupform.Bothgroupswerealsogivendietadvicean dBcomplexsupplements.The patients were asked to return for follow-up after 1 week for reticulocytecount.Complianceandsideeffectswerecheckedbyverbalenquiry.Verificationwasdonebycheckin gtheusedbottles. A repeathemoglobinwasdoneattheendof1month.Rise in hemoglobin, compliance and side effects were compared between thegroups.

## Statistical Methods:-

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22versionsoftware. Categoricaldatawasrepresentedintheformof Frequenciesandproportions. **Chi- square test or Fischer's exact test** (for 2x2 tables only) was used as test ofsignificanceforqualitativedata. Continuousdatawasrepresentedasmeanandstandarddeviation. **Independent t test or Mann Whitney U test** was used as test of significance toidentify themeandifference betweentwo quantitative variables and qualitativevariablesrespectively.

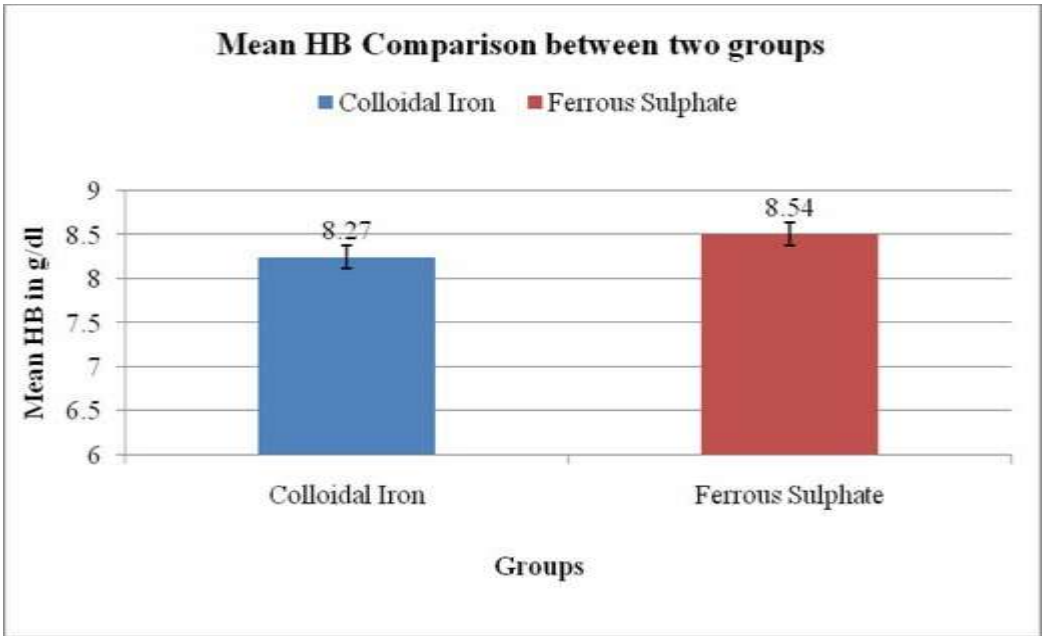
**Inclusion Criteria**:
All OPD and admission cases at MVJ hospital aged between 6 months to 18years who are diagnosed as Iron deficiency anemia based on clinical and laboratoryparameters(Completebloodcount)

**ExclusionCriteria**:
1. Severeconcurrentillness(cardiovascular,renal,hepatic)
2. Ongoingbloodloss(epistaxis,GIbloodloss)
3. Co-morbiditiesaffectingtheabsorption(malabsorption,celiacdisease)

## Results:-

**Comparingbaselinehaemoglobinbetweentwogroups :**

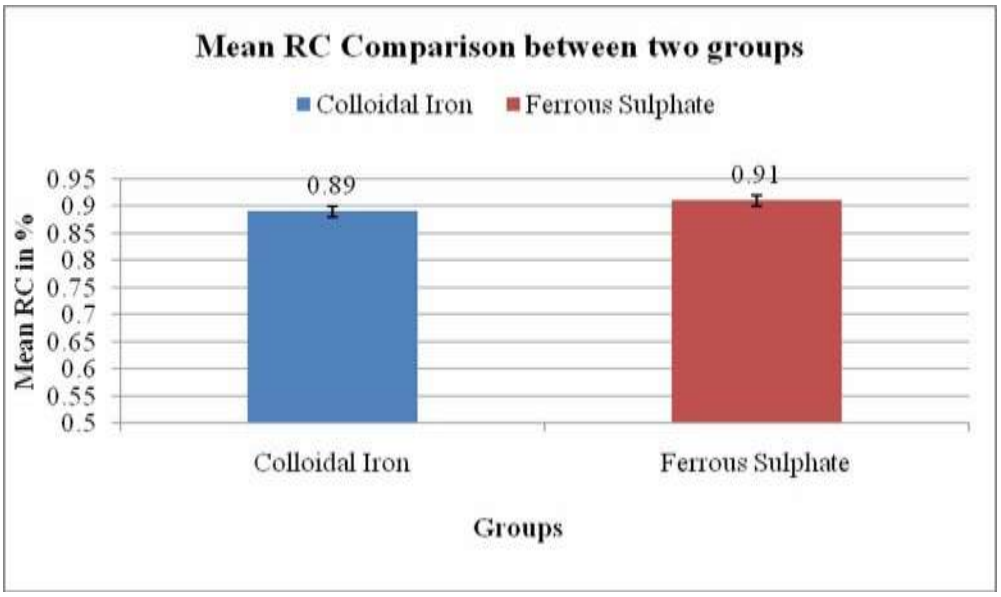
| | Group | | | | pvalue |
|---|---|---|---|---|---|
| | ColloidalIron | | FerrousSulphate | | |
| | MeanHBing/dl | SD | MeanHBing/dl | SD | |
| **HB** | 8.27 | 1.98 | 8.54 | 1.86 | 0.497 |
| **TOTAL** | **75** | | **75** | | |




**BardiagramshowingMeanHBComparisonbetweentwogroups**
Mean baseline haemoglobin in colloidal iron group was 8.27 ± 1.98 and in ferroussulphate Groupwas8.54±1.86.Hence,thebaselinehemoglobinwasnotstatisticallysignificantbefore thestartofthetreatment.

**Meanbaselinereticulocytecountcomparisonbetweentwogroups:**

| 1) | ColloidalIron | | FerrousSulphate | | |
|---|---|---|---|---|---|
| | MeanRCin% | SD | MeanRCin% | SD | |
| RC | 0.89 | 0.44 | 0.91 | 0.7 | 0.848 |
| TOTAL | 75 | | 75 | | |

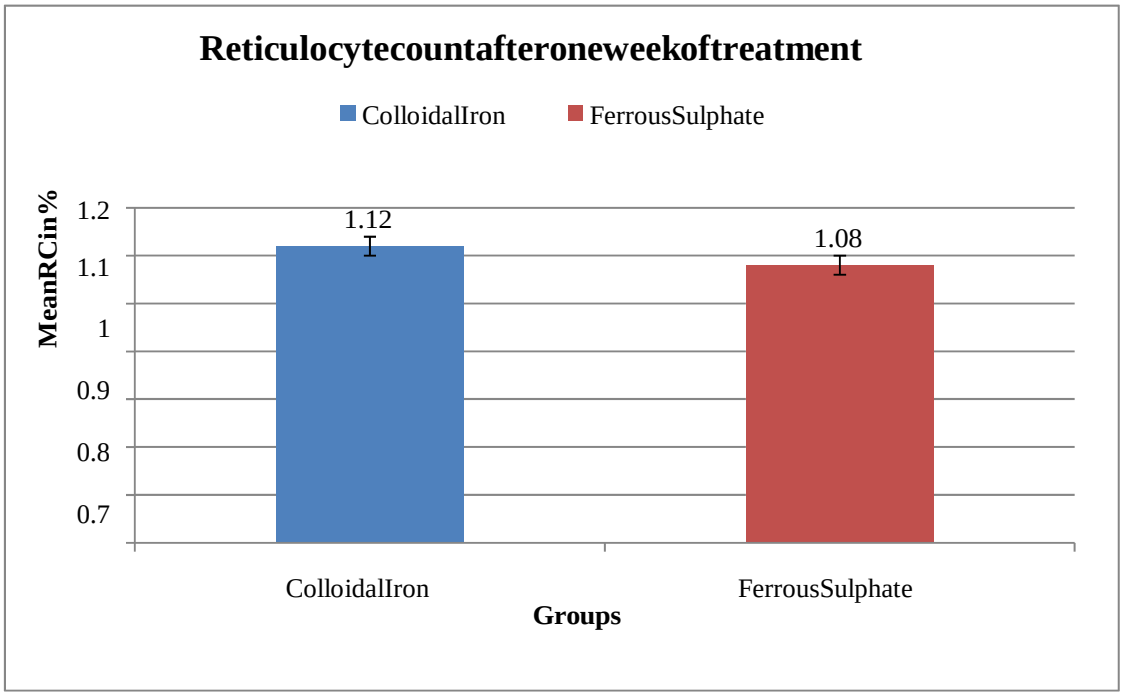



**BardiagramshowingMeanRCComparisonbetweentwogroups**

Mean baseline reticulocyte countin colloidal iron group was 0.89 ± 0.44 and in ferrous sulphate group was 0.91 ± 0.7. Hencemean baseline reticulocyte count wasnotstatistically significant.

**Meanreticulocytecountafter1weekoftreatment :**

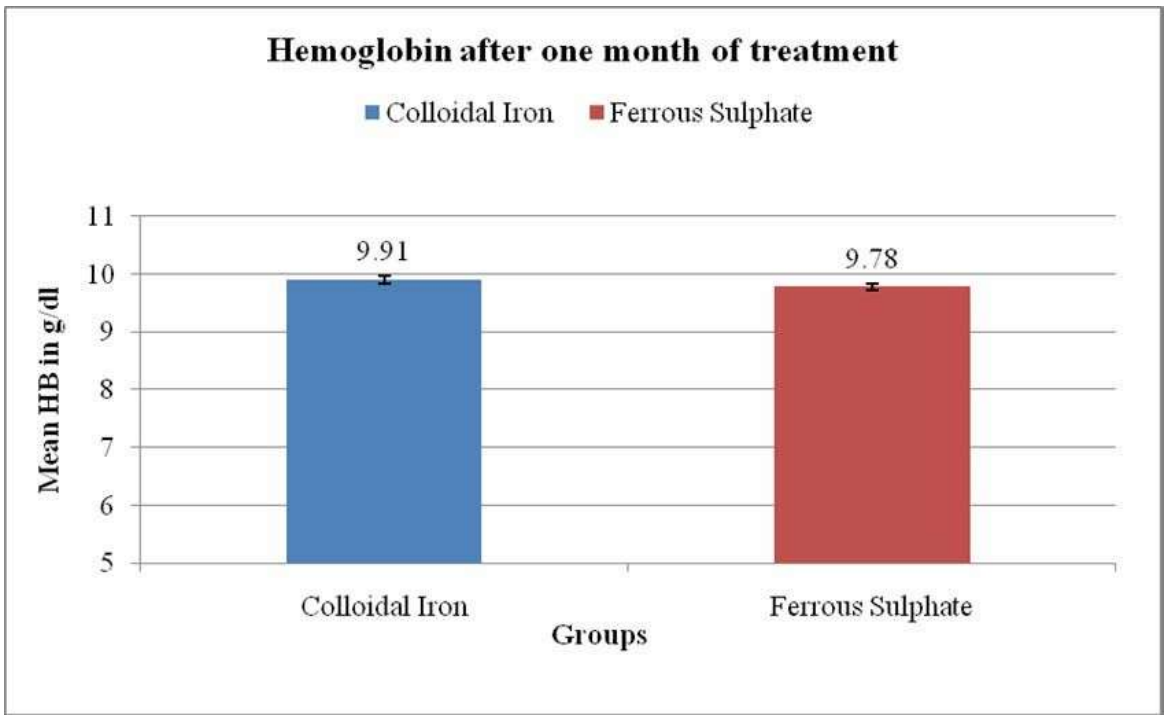
| | Group | | | | pvalue |
|---|---|---|---|---|---|
| | ColloidalIron | | FerrousSulphate | | |
| | MeanRCin% | SD | MeanRCin% | SD | |
| F/URC | 1.12 | 0.49 | 1.08 | 0.59 | 0.748 |
| **TOTAL** | **75** | | **75** | | |




**BardiagramshowingMeanF/URCComparisonbetweentwogroups**

**Meanfollow-upHBafter1monthoftreatment:**

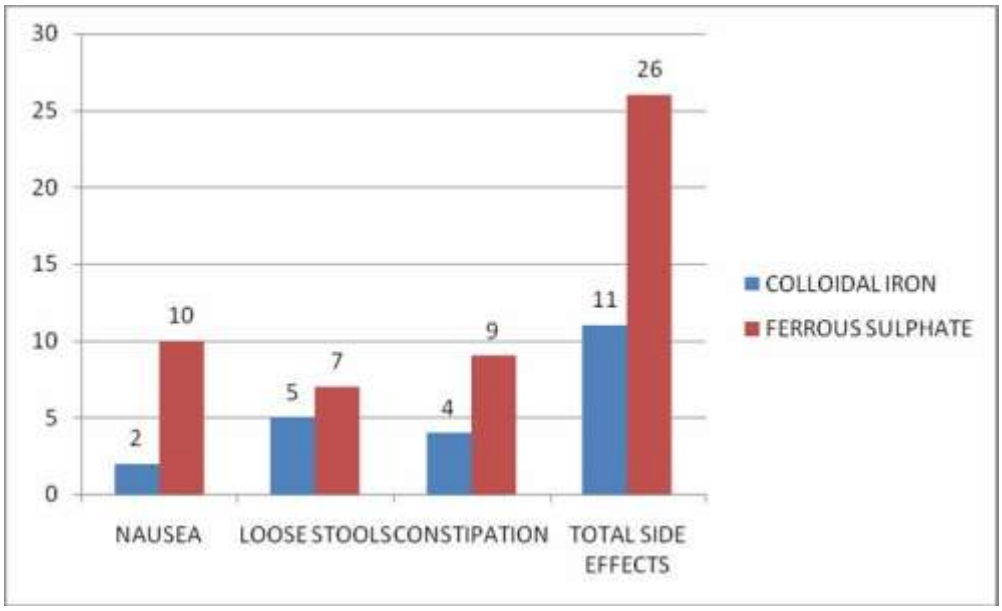
| | Group | | | | pvalue |
|---|---|---|---|---|---|
| | ColloidalIron | | FerrousSulphate | | |
| | MeanHBing/dl | SD | MeanHBing/dl | SD | |
| F/UHB1m | 9.91 | 1.75 | 9.78 | 1.73 | 0.689 |
| **TOTAL** | **75** | | **75** | | |




**BardiagramshowingMeanF/UHB1month comparisonbetweentwogroups**

**Comparisonofsideeffects betweentwogroups:**

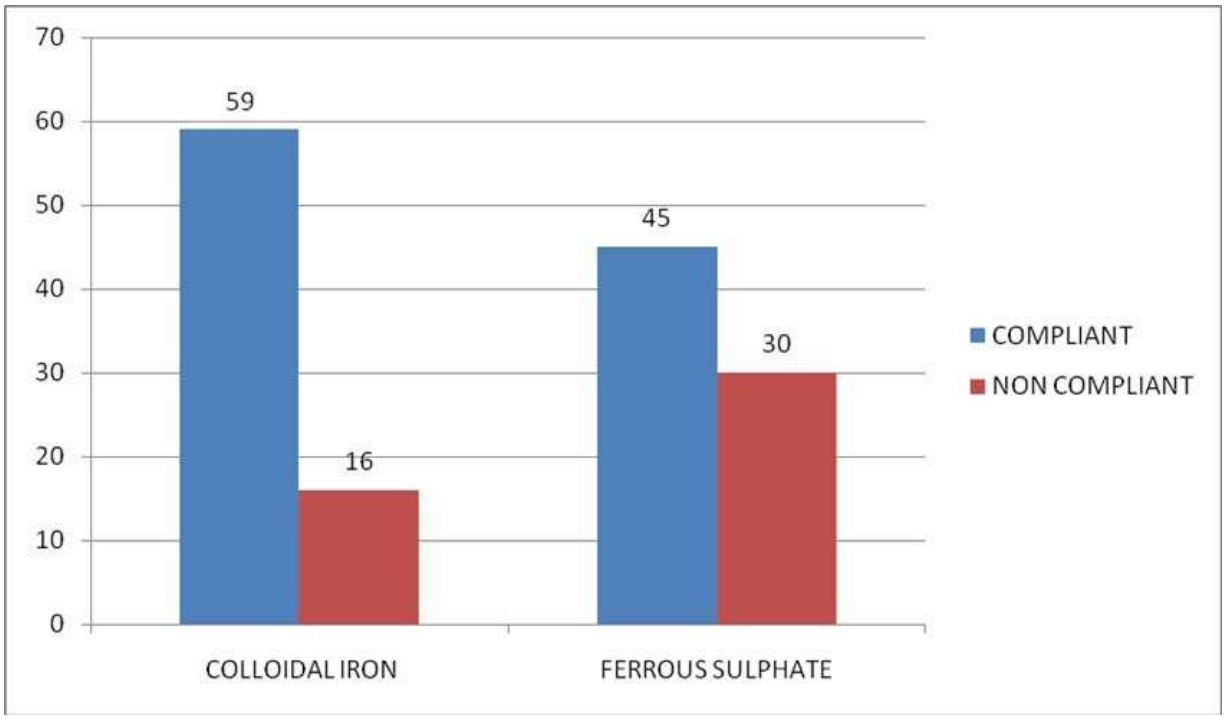
| | | Group | | | | p value |
|---|---|---|---|---|---|---|
| | | ColloidalIron | | FerrousSulphate | | |
| | | Count | ColumnN% | Count | ColumnN% | |
| Sideeffect | Nausea | 2 | 2.60% | 10 | 13.00% | **0.025*** |
| | Loosestools | 5 | 6.600% | 7 | 9.3.00% | 0.543 |
| | Constipation | 4 | 5.30% | 9 | 12.00% | 1.000 |
| Totalsideeffects | | 11 | 14.5% | 26 | 34.3% | 0.151 |




**Bar Diagram Showing Side Effects Distribution between two groups .**
Oncomparingthesideeffects,itwasfoundthattotalpercentageofsideeffectsincolloidalirongroupwas14.5% andinferroussulphategroupwas34.3%butthedifferencewasnotstatisticallysignificantexceptnausea,where moreparticipantsinferroussulphategroupdevelopednauseawhichwasstatisticallysignificant.

**Compliance between two groups** :

| | | **ColloidalIron** | | **FerrousSulphate** | | |
|---|---|---|---|---|---|---|
| | | **Count** | **ColumnN%** | **Count** | **ColumnN%** | |
| Compliance | Compliant | 59 | **78.00%** | 45 | **60.00%** | |
| | Noncompliant | 16 | 21.00% | 30 | 44.00% | **0.013** |



**BarDiagramShowingcomplianceDistributionbetweentwogroups.**

Out of75colloidal iron cases, 59 cases **(78%)** had good compliance. Out of 75ferroussulphatecases,45cases**(60%)**hadgoodcompliance.Hence,compliancewasbetterwithcolloidalironwhichwas statisticallysignificant.

## Conclusion:-

The study was done to compare the therapeutic efficacy and side effectsof ferroussulphate with colloidal iron in the treatment of iron deficiency anemia in childrenaged6monthsto18years.Itwasnotedthatthemeanreticulocytecountbytheendofone week of treatment increased by 20% in colloidal iron group and by 15% inferrous sulphate group. Mean haemoglobin increased by 16% in colloidal iron groupandby13%inferroussulphategroup.However,theincreaseinrecticcountandhaemoglobinwasnotstatisticallysignificant. On comparing the side effects between the two groups, 34.3% cases hadGI side effects in ferrous sulphate group compared to 14.5% in colloidal iron group.Hence colloidal iron had 78%good compliance compared to 60% with ferroussulphate which is statistically significant . Hence colloidal ironand ferrous sulphateisfoundtobeequallyefficacioustotreatirondeficiencyanemiainchildrenbetween6monthsto18years.However,sideeffectsandcomplianceprofilewassignificantlybetterincolloidalironcomparedtoferroussulphate.

## References:-


1. Touting F, LeGall E, Gander V . Iron deficiency anemia in children and teenager; Ahealthproblemthatisstillpresent.ArchPediatr.2012;19:1127-31.
2. WorldwidePrevalenceofanemia.1993-2005.RetrievedfromWHOGlobalDatabaseon Anemia, Geneva. Available at https://www.who.int/vmnis/anaemia/prevalence/summary/anaemia_data_status_t2/en/.Accessedon10December2020.
3. Khedr E, Hamed SA, Elbeih E, Elshereef H, Ahmad Y, Ahmed S. Iron states andcongnitive abilities in young adults: Neuropsychological and neurophysiologicalassessment.EurArchPsychiatryClinNeurosci.2008;258:489-96.
4. WHO.Anemia.Availablefrom:https://www.who.int/health-topics/anaemia#tab=tab_1[AccessedonAugust20,2020].
5. Guideline: daily iron supplementation in adult women and adolescent girls. Geneva:WorldHealthOrganization;2016.Availablefrom:https://apps.who.int/iris/bitstream/handle/10665/204761/9789241510196_eng.pdf?sequence=1&isAllowed=y[AccessedonAugust20,2020].
6. Puranik A, N S. Anemia Among Children Under 5 Years in India: A District-LevelSpatial Analysis Using NFHS-5 Data. Asia Pac J Public Health. 2022 Mar;34(2-3):206-212
7. Bovell-BenjaminAC,ViteriFE,AllenLH.Ironabsorptionfromferrousbisglycinateand ferric trisglycinate in whole maize is regulated by iron status. Am J Clin Nutr.2000;71(6):1563-9.
8. NationalRuralHealthMission.NationalIronplusinitiative.GuidelinesforControlofIronDeficiencyAnemia.AdolescentDivisionMinistryofHealthandFamilyWelfare
9. GovernmentofIndia2013;5-17
10. Elizabeth M, Poskitt EME. “Historical Review of iron deficiency anemia”. British JofHemato2003;(122):554–562
11. LichtmannMA,BeutlerE,SeligeohnU,KaushanskyK,KippsTO.Disordersofironmetabolism.Williamshematology,7thedn.:1237-48
12. KotechaPV.NutritionalAnemiainYoungChildrenwithFocusonAsiaandIndia.
13. IndianJofCommMed2011;(36):8-16
14. Iron Deficiency Anemia Assessment, Prevention and Control: A guide for programmemanagers.WHO,Geneva2001;(65):19-20.