

PERINATAL OUTCOME OF TWIN GESTATION: A STUDY OF 100 TWIN PREGNANCIESDattatraya Gopalghare¹, Niranjan Mayadeo²**HOW TO CITE THIS ARTICLE:**

Dattatraya Gopalghare, Niranjan Mayadeo. "Perinatal Outcome of Twin Gestation: A Study of 100 Twin Pregnancies". Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 58, November 03; Page: 13101-13110, DOI: 10.14260/jemds/2014/3742

ABSTRACT: BACKGROUND: Perinatal mortality is an index of obstetric care. Recent advances in obstetrics & neonatology have dramatically improved perinatal outcome in various types of high risk pregnancies. Nonetheless the risk in twin gestation remains significantly higher than that of singleton. **AIMS AND OBJECTIVE:** To find out perinatal mortality & morbidity in twin gestation and the factors affecting the same. **STUDY SETTING:** A tertiary care hospital attached to Seth GS Medical College, Mumbai. **STUDY DESIGN:** A retrospective observational study. **MATERIALS AND METHODS:** Study of 100 successive twin deliveries in a tertiary care hospital over a period of 28 months, excluding the Births less than 28 weeks. Perinatal outcome in all these patients was studied. Different factors affecting perinatal mortality & morbidity were studied. **DATA ANALYSIS:** Rates, Ratios, Proportions and Chi-square tests. **CONCLUSION:** In spite of so many advances in obstetrics & neonatology, the perinatal mortality in twin gestation is still alarmingly high. In present study the perinatal mortality was 18% & NICU admission rate was 25.5%. In conclusion it can be said that early diagnosis, proper antenatal care, vigilance during labour and good NICU facilities can improve the perinatal outcome in twin gestation.

KEYWORDS: Twin gestation, perinatal outcome, perinatal morbidity, perinatal mortality, antenatal care, mode of delivery, birth weight, neonatal care.

INTRODUCTION: Perinatal mortality is an index of obstetric care. Recent advances in obstetrics & neonatology have dramatically improved perinatal outcome in various types of high risk pregnancies. Nonetheless the risk in twin gestation remains significantly higher than that of singleton. Since the advent of infertility treatment, multiple pregnancies have become increasingly common. While multiples account for only a small percentage of all births (less than 3 percent), the multiple birth rate is rising. Despite the great advances in perinatal & maternal mortality multiple gestations still presents formidable hazards both to the mother & her baby. As long as in 1865 Mathew Duncan wrote." The rarity of pleural birth in woman & increased danger to mother & offspring's in these circumstances renders such an event in a limited sense a disease or an abnormality." Multiple pregnancies has remained a curiosity for the layman, burden for the mother, risk for the fetus & delivery requiring great skill, judgment, patience & dexterity on the part of the obstetrician. Perinatal mortality is a sensitive parameter reflecting the standard of obstetric & perinatal care as well as effectiveness of social measures in general & of public health in particular.

AIMS AND OBJECTIVES:

To find out perinatal mortality & morbidity in twin gestation.

To find out factors affecting perinatal mortality & morbidity in twin gestation.

ORIGINAL ARTICLE

MATERIAL AND METHODS: Study of 100 successive twin deliveries in a tertiary care hospital over a period of 28 months with gestational age of 28 weeks and more. Patients came from mixed socioeconomic strata. Different antenatal & intra partum factors affecting the twin gestation were studied. Perinatal outcome in all these patients was studied. Different factors affecting perinatal mortality & morbidity were studied. Reasons for NICU admission & duration of NICU stay were observed. Incidence of stillbirths was studied. Maternal complications of twin gestation & its effect on perinatal outcome were studied.

RESULTS AND ANALYSIS:

1. **PERINATAL MORTALITY:** Out of 200 babies there were 36 deaths i.e. incidence of 18%. Out of that 11 were still births.

2. **MATERNAL AGE AND PERINATAL OUTCOME:**

Maternal age group	No. of babies	Perinatal mortality	NICU admissions
<25 years	100	19 [19%]	30 [30%]
26-30 years	60	10 [16.6%]	9 [15%]
>31 years	40	7 [17.5%]	12 [30%]
Total	200	36 [18%]	51 [25.5%]

Table 1: Perinatal mortality & NICU admission rate according to maternal age

3. **PERINATAL OUTCOME IN REGISTERED AND UNREGISTERED CASES:**

	No. of babies	Perinatal mortality	NICU admissions
Registered cases	180	30 [16.6%]	46 [25.5%]
Unregistered cases	20	6 [30%]	5 [25%]
Total	200	36 [18%]	51 [25.5%]

Table 2: Perinatal outcome in registered & unregistered cases

Three studies described by Newman & Ellings showed that antepartum care in a twin clinic decreases need for antenatal hospitalization, decreases no. of very low birth weight babies, decreases perinatal mortality rate, decreases incidence of preterm deliveries & overall there is improvement in perinatal outcome.¹

4. **PARITY AND PERINATAL OUTCOME:**

Parity	No. of babies	Perinatal mortality	NICU admissions
Primigravidas	132	23 [17.4%]	31 [23.48%]
Multiparous	68	13 [19.1%]	20 [58.82%]
Total	200	36 [18%]	51 [25.55]

Table 3: Parity & perinatal outcome

ORIGINAL ARTICLE

5. INFERTILITY TREATMENT AND PERINATAL OUTCOME

	No. of babies	Perinatal mortality	NICU admissions
Infertility Rx taken	18	6 [33.44%]	2 [11.11%]
Conceived spontaneously	182	30 [16.48%]	49 [26.92%]
Total	200	36 [18%]	51 [25.5%]

Table 4: Infertility & perinatal outcome

Wyshak G showed that ovulation induction & IVF increases incidence of twin gestation.²

6. GESTATIONAL AGE AT DIAGNOSIS AND PERINATAL OUTCOME

Gestational age at diagnosis	No. of babies	Perinatal mortality	NICU admissions
Diagnosed <25 weeks	70x2=140	26 [18.57%]	34 [24.28%]
Diagnosed >26weeks	30x2=60	10 [33.33%]	17 [56.66%]
Total	100x2=200	36 [18%]	51 [25.5%]

Table 5: Gestational age at diagnosis & perinatal outcome

7. CERVICAL ENCIRCLAGE AND PERINATAL OUTCOME

	<37 weeks	>37 weeks	No. of babies	Perinatal mortality	NICU admissions
Encirclage[11]	5 [45.45%]	6 [54.54%]	22	1 [4.54%]	9 [40.9%]
No encirclage [89]	48 [53.93%]	41 [46.06%]	178	35 [19.66%]	42 [23.59%4]
Total	53	47	200	36	51

Table 6: Cervical encirclage & perinatal outcome

A study by Dor J et al showed that, no significant reduction in preterm delivery & perinatal mortality has been observed by prophylactic encirclage in twin gestation.³

8. GESTATIONAL AGE AT DELIVERY AND PERINATAL OUTCOME

Gestational age at delivery	No. of babies	Perinatal mortality	NICU admissions
28-33 weeks [18]	36	24 [66.66%]	12 [33.33%]
34-36 weeks [28]	56	6 [10.71%]	26 [46.42%]
>37 weeks [54]	108	6 [5.55%]	13 [12.03%]
Total [100]	200	36 [18%]	51 [25.5%]

Table 7: Gestational age at delivery & perinatal outcome

ORIGINAL ARTICLE

In present study 46 delivered before 37 weeks. Alexander et al observed 13.94% patients delivered before 33 weeks & 50.74% delivered before 37 weeks⁴. Callahan et al observed that incidence of preterm labour in twins is 20—72%, & is more common in monozygotic twins.⁵ Modified home bed rest has been proposed by Newman & Ellings to improve perinatal outcome.⁶ Goldenberg et al observed that a positive cervicovaginal foetal fibronectin assay at 28 weeks is predictive of increased preterm delivery prior to 32 weeks with an odds ratio 9:4.⁷ Keirse et al observed that prophylactic tocolysis in twin gestation is of no value.⁸

9. MODE OF DELIVERY AND PERINATAL OUTCOME:

Mode of delivery	No. of babies	Perinatal mortality	NICU admissions
Normal	42	13 [30.95%]	8 [19.04%]
Vaginal breech	2	0	2 [100%]
Instrument	13	2 [15.38%]	3 [23.07%]
LSCS	43	0	10 [23.25%]
Total	100	15 [15%]	23 [23%]

Table 8: Mode of delivery & perinatal outcome in first twin

Mode of delivery	No. of babies	Perinatal mortality	NICU admissions
Normal	37	11 [29.72%]	12 [32.43%]
Vaginal breech	9	3 [33.33%]	6 [66.66%]
Instrument	7	2 [28.57%]	1 [14.28%]
LSCS	47	5 [10.63%]	9 [19.14%]
Total	100	21 [21%]	28 [28%]

Table 9: Mode of delivery & perinatal outcome in second twin

Divon et al observed that mal presentations are common in twin gestation but often resolve before onset of labour.⁹ O, Connor et al observed that twins tend to deliver much earlier than singletons & the mean gestation age difference is 19 days.¹⁰ McCarthy et al & Fishman et al observed no significant difference in perinatal outcome in non-vertex second twin delivered vaginally & those delivered by cesarean section.^{11,12} Suneet et al recommended to consider vaginal delivery in non-vertex second twin if expected birth weight is more than 1.5 kg.¹³

10. BIRTH ORDER AND PERINATAL OUTCOME: Perinatal mortality in first twin is 15% & in second twin is 21%. NICU admission rate in first twin is 23% & in second twin is 28%. Botting et al observed that perinatal mortality for twins was 47 –120 per 1000 births, with more risk to the second twin.¹⁴

ORIGINAL ARTICLE

11. BIRTH INTERVAL AND PERINATAL OUTCOME:

Birth interval	Perinatal mortality	NICU admissions
<10 minutes[164]	18 [10.97%]	41 [25%]
11 -20 minutes[12]	2 [16.66%]	7 [58.33%]
>21 minutes[24]	16 [66.66%]	3 [12.5%]
Total[200]	36 [18%]	51 [25.55]

Table 10: Birth interval & perinatal outcome

12. BIRTH WEIGHT AND PERINATAL OUTCOME:

FIRST TWIN:

Birth weight	No. of babies	Perinatal mortality	NICU admissions
<1.5 kg	17	11 [64%]	6 [36%]
1.5-2.4 kg	73	4 [5.47%]	15 [20.54%]
>2.5 kg	10	0 [0%]	2 [20%]
Total	100	15 [15%]	23 [23%]

Table 11: Birth weight & perinatal outcome in first twin

SECOND TWIN:

Birth weight	No. of babies	Perinatal mortality	NICU admissions
<1.5 kg	24	13 [54.16%]	10 [41.66%]
1.5-2.4 kg	62	4 [6.45%]	18 [29.03%]
>2.5 kg	14	4 [28.57%]	0 [0%]
Total	100	21 [21%]	28 [28%]

Table 12: Birth weight & perinatal outcome in second twin

Alexander et al observed that in twins 10.12% babies weighed less than 1.5 kg & 52.24% weighed less than 2.5 kg.¹⁵

13. DISCORDANT TWINS: The criteria for discordant growth based on birth weight is weight difference of more than 250 grams or difference of more than 25%. In present study discordant growth was observed in 53 twins. Out of these 53; 20 were monochorionic. In this group the perinatal mortality was 16.03% & babies requiring NICU care were 24.52%. Urig et al & Moore et al observed that; there is threefold increase in perinatal mortality in monochorionic twins as compared with dichorionic twins.¹⁶ Victoria et al also observed that severe discordance occurs more frequently in monochorionic twins.¹⁷ Erkkola et al observed significantly high perinatal mortality rate in twins with weight difference of 25% or more.¹⁸ Blickstein et al mentioned that discordant second twin seems to suffer most.¹⁹

ORIGINAL ARTICLE

14. SEX AND PERINATAL OUTCOME:

Sex of the Baby	No. of babies	Perinatal mortality	NICU admissions
Male	119 [59.5%]	28 [23.52%]	25 [21%]
Female	81 [40.5%]	8 [9.87%]	26 [32.09%]
Total	200	36 [18%]	51 [25.5%]

Table 13: Sex & perinatal outcome

15. CHORIONICITY AND PERINATAL OUTCOME:

Chorionicity	No. of babies	Perinatal mortality	NICU admissions
Monochorionic	27x2=54	14 [25.92%]	14 [25.92%]
Dichorionic	73x2=146	22 [15.06%]	37 [25.34%]
Total	100x2=200	36 [18%]	51 [25.55%]

Table 14: Chorionicity & perinatal outcome

Neilson et al found that in monochorionic twins perinatal mortality is increased three times as compared with dichorionic twins.²⁰ In present study only 4 twins were monoamniotic, out of which 2 babies died.

16. MALFORMATIONS IN TWINS: In present study patients included were above 28 weeks of gestation; so many malformed babies were not included. Only two babies had significant malformations; one with congenital diaphragmatic hernia & other with anencephaly. Both the babies expired. Mastroiacovo et al reported increased incidence of malformations at all anatomical sites in twins as compared with singleton pregnancy.²¹

17. MATERNAL COMPLICATINS AND PERINATAL OUTCOME

Maternal complication	No. of babies	Perinatal mortality	NICU admissions
Anaemia [15]	30	6 [20%]	13 [43.3%]
PIH [25]	50	8 [16%]	9 [18%]
Total [40]	80	14 [17.5%]	22 [27.5%]

Table 15: Perinatal outcome in anaemia & PIH

Spellacy et al, Ros et al & Campbell et al all observed that; gestational hypertension in twins occurs with relative risk of 1.2 to 2.7 times compared with singleton pregnancy.^{22,23,24} Blickstein et al observed that preeclampsia patients delivered at an earlier gestational age had increased incidence of low birth weight & poor perinatal outcome.²⁵

18. STILL BIRTHS IN TWINS

Still births	First twin	Second twin
Fresh Still births [8]	0	8
Macerated Still births [3]	3	0
Total [11]	3	8

Table 16: Incidence of stillbirths in twins

ORIGINAL ARTICLE

In present study there were total 11 still births out of 200 babies born that gives incidence of 55 per 1000 births. Out of 11 stillbirths 8 were fresh stillbirths & 3 were macerated stillbirths. All 8 fresh still births were observed in second twin & all 3 macerated stillbirths were in first twin.

- 19. NICU STAY:** Out of 51 NICU admissions; 17 required care for less than 5 days, 17 others for less than 10 days, 2 for less than 15 days, 7 for less than 20 days & 8 babies were in NICU for more than 21 days. Commonest reason for NICU admission was prematurity & low birth weight.
- 20. CAUSES OF PERINATAL MORTALITY:** In this study out of 200 babies 36 babies expired because of various causes as; Still births- 11, Prematurity & low birth weight – 16, Septicaemia- 5, Respiratory distress syndrome- 3 & Congenital malformations- 2.

DISCUSSION: Out of 200 babies born there were 36 deaths, giving incidence of 18%. There were 8 fresh & 3 macerated still births. 15 deaths were in first twin & 21 in second twin. Mothers below 25 & above 30 had higher foetal losses. Perinatal mortality and NICU admission rate was less in registered cases than in unregistered cases. Perinatal mortality and morbidity was more in multiparous patients than in primis. Perinatal mortality in infertility treated conceptions was more than those conceived spontaneously. Most of twins were diagnosed on ultrasonography. Those diagnosed earlier had better perinatal outcome.

Perinatal outcome was much better in those who had undergone cervical encirclage. A study by Dor J et al showed that, no significant reduction in preterm delivery & perinatal mortality has been seen by prophylactic encirclage in twin gestation.³ Perinatal outcome was much better in those delivered at term than the preterm ones. Alexander et al observed 13.94% patients delivered before 33 weeks & 50.74% delivered before 37 weeks.⁴ Callahan et al observed that incidence of preterm labour in twins is 20–72%, & is more common in monozygotic twins.⁵ Modified home bed rest has been proposed by Newman & Ellings to improve perinatal outcome.⁶

Goldenberg et al observed that a positive cervicovaginal foetal fibronectin assay at 28 weeks is predictive of increased preterm delivery prior to 32 weeks with an odds ratio 9:4.⁷ Keirse et al observed that prophylactic tocolysis in twin gestation is of no value.⁸ Use of steroids can be made to accentuate foetal lung maturity in preterm patients. Cesarean section had much better outcome for both the first and second twin. Divon et al observed that mal presentations are common in twin gestation but often resolve before onset of labour.⁹

O, Connor et al observed that twins tend to deliver much earlier than singletons & the mean gestation age difference is 19 days.¹⁰ McCarthy et al & Fishman et al observed no significant difference in perinatal outcome in on vertex second twin delivered vaginally & those delivered by cesarean section.^{11,12} Suneet et al recommended to consider vaginal delivery in non-vertex second twin if expected birth weight is more than 1.5 kg.¹³ Most authorities advocate delivery by cesarean section for non-vertex first twin.¹⁰ Perinatal mortality and NICU admission rate was more in second twin.

Botting et al observed that perinatal mortality for twins was 47–120 per 1000 births, with more risk to the second twin.¹⁴ Perinatal outcome was better in group where birth interval was less than 10 minutes. Low birth weight babies had poor outcome. Alexander et al served that in twins 10.12% babies weighed less than 1.5 kg & 52.24% weighed less than 2.5 kg.¹⁵ The criteria for discordant growth based on birth weight is weight difference of more than 250 grams or difference of

ORIGINAL ARTICLE

more than 25%. In present study it was observed in 53 twins i.e. 106 babies were discordant. Out of these 53; 20 were monochorionic with perinatal mortality of 16.03% & NICU admission rate of 24.52%. Urig et al & Moore et al observed that; there is threefold increase in perinatal mortality in monochorionic twins as compared with dichorionic twins.¹⁶

Victoria et al also observed that severe discordance occurs more frequently in monochorionic twins.¹⁷ Erkkola et al observed significantly high perinatal mortality rate in twins with weight difference of 25% or more.¹⁸ Blickstein et al mentioned that discordant second twin seems to suffer most.¹⁹ Perinatal outcome in male babies was relatively poor. Perinatal outcome was poor in monochorionic twins as compared to dichorionic twins. Neilson et al found that in monochorionic twins perinatal mortality is increased three times as compared with dichorionic twins.²⁰

In present study patients only two babies had significant malformations; one with congenital diaphragmatic hernia & other with anencephaly. Both the babies expired. Mastroiacovo et al reported increased incidence of malformations at all anatomical sites in twins as compared with singleton pregnancy.²¹ Two commonest maternal complications observed in present study were anaemia & pregnancy induced hypertension.

Spellacy et al, Ros et al & Campbell et al observed that; gestational hypertension in twins occurs with relative risk of 1.2 to 2.7 times compared with singleton pregnancy.^{22,23,24} In present study out of 200 babies 36 babies expired because of various causes as; 1. Still births-11, 2. Prematurity & low birth weight-16, 3. Septicaemia-5 & 4. Respiratory distress syndrome-3.

CONCLUSION: In spite of so many advances in obstetrics & neonatology, the perinatal mortality in twin gestation is still alarmingly high. Mothers below 25 & above 30 had higher foetal losses. In unregistered cases perinatal mortality was 30% & infertility group it was 33.33%. Early diagnosis may improve the perinatal outcome. The most important risk factor is prematurity which cannot be effectively tackled by any means. Perinatal outcome in twins delivered by cesarean section was much better than those who delivered vaginally, irrespective of the indication of the cesarean section.

Perinatal mortality as well as morbidity is significantly higher in second twin as compared to the first twin. Prolonged birth interval between the first and second twin worsens the perinatal outcome. Perinatal outcome in female babies was better than male babies. Perinatal outcome was poor in monochorionic twins. Perinatal outcome in patients complicated with PIH or anaemia was poor. Commonest reason for NICU admission was prematurity & low birth weight. So to conclude it can be said that early diagnosis, proper antenatal care, vigilance during labour and good NICU facilities can improve the perinatal outcome in twin gestation.

BIBLIOGRAPHY:

1. Ellings JM, Newman RB, Husley TC et al: Reduction in very low birth weight deliveries and perinatal mortality in a specialized multidisciplinary twin clinic: *Obstet Gynaecol* 81: 387-91, 1993.
2. Wyshak G: Statistical findings on effects of fertility drugs on pleural births: *Twin Research Part B, Biology and Epidemiology*. Alan R. Liss: New York 34: 17-33, 1978.
3. Dor J, Shalev J, Masiach et al: Elective cervical suture of twin pregnancies diagnosed ultrasonically in the first trimester following induced ovulation. *Gynaecol Obstet Invest* 13: 55, 1982.

ORIGINAL ARTICLE

4. Alexander GR, Kogan M, Martin J et al: What are the foetal growth patterns of singletons, twins and triplets in the United States? *Clin Obstet Gynaecol* 48: 115-25, 1999.
5. Callahan TL, Hall JE, Ettner SL et al: The economic impact of multiple gestation pregnancies and the contribution of assisted reproductive techniques to their incidence. *N Engl J Med* 331: 224, 1994.
6. Newmann RB, Ellings JM: Antepartum management of the multiple gestation. *semin Perinatal* 19: 387, 1995.
7. Goldenberg RI, Lams JD, Miodovnik M et al: The preterm prediction study: Risk factors in twin gestations. *Am J Obstet Gynaecol* 175: 1047, 1996.
8. Keirse MJNC, Grant A, King JF: Preterm labour. In Chalmers I, Enkin M, Keirse MJNC: *Effective Care of Pregnancy and Childbirth*. Oxford University Press, New York 644-46, 1989.
9. Divon MY et al: Twin gestation: Foetal malpresentation as a function of gestational age. *Am J Obstet Gynaecol* 168: 1500-02, 1993.
10. O'connor R A,Hiadzi E :The intrapartum management of twin pregnancy.*Am J Obstet gynaecol* 141: 252-256, 1981.
11. McCarthy BJ etal, The epididomology of neonatal death in twins, *Am J Obstet Gynecol* 141:252-256, 1981.
12. Fishman A. et al: Vaginal delivery of the non-vertex second twin. *Am J Obstet Gyneco* 168:861-864, 1993.
13. Sunit P: Chauhan and William E. Roberts: Intrapartum management. In Stanely A. *Multiple pregnancy and delivery*, Mosby, 243-280, 1996.
14. Botting BJ, Mac Donald-Dvies I, MacFarlane AJ: Recent trends in incidence of multiple births and associated mortality. *Arch Dis Child* 62: 941, 1987.
15. Alexander GR, Kogan M, Martin J et al: What are the foetal growth patterns of singletons, twins and triplets in the United States? *Clin Obstet Gynaecol* 48: 115-25, 1999.
16. Urig MA, Clewell WH, Elliot JP: Twin-twin transfusion syndrome. *Am J Obstet gynaecol* 163: 1522-26, 1990.
17. Victoria A, Mora G, Arias F: Perinatal outcome, placental pathology, and severity of discordance in monochorionic and dichorionic twins. *Obstet and Gynaecol* 97: 310-15, 2001.
18. Errkola R, Ala-Melleo S, Piironen Oet al: Growth discordancy in twin pregnancies. A risk not detected by measurements by biparital diameter. *Obstet Gynaecol* 66: 201, 1985.
19. Luke B, Keith L: The contribution of singletons,twins, and triplets to low birth weight, infant mortality and handicap in the United States, *J Reprod Med* 37: 661-65, 1992.
20. Neilson JP, Danskin F, Hastle SJ: Monozygotic twin pregnancy: Diagnostic and Doppler ultrasound studies. *Brit J Obstet Gynecol* 96: 1413-18, 1989.
21. Mastroiacovo P, Castilla EE, Arpino C et al: Congenital malformations in twins: An international study. *American Journal of Medical genetics* 83: 117-24, 1999.
22. Spellacy WN, Handler A, Ferre C: A case control study of 1253 twin pregnancies from a 1982-1987perinatal database. *Obstet and Gynecol* 75: 168-71, 1990.
23. Ros HS, Cnattingius S, Lipworth L: Comparison of risk factors for preeclampsia and gestational hypertension in a population based cohort study. *Am J Epid* 147: 1062-70, 1998.
24. Campbell DM, Mac Gillivray I: Preeclampsia in twin pregnancies: Incidence and outcome 18: 197-207, 1999.

ORIGINAL ARTICLE

25. Blickstein I, Benhur H, Borenstein R: Perinatal outcome in twin pregnancies complicated by preeclampsia. Am JPerinatol 9 (4): 254-60, 1992.

AUTHORS:

1. Dattatraya Gopalghare
2. Niranjan Mayadeo

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Obstetrics and Gynaecology, MIMER Medical College, Talegaon Dabhade, Pune.
2. Professor, Department of Obstetrics and Gynaecology, Seth G. S. Medical College, Mumbai.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Dattatraya Gopalghare,
D4-301, Latis Co-op hsg soc,
Talegaon Chakan Road,
Talegaon Dabhade,
Tal-Maval, Pune-410507.
Email: drgopalghare@yahoo.co.in

Date of Submission: 06/10/2014.
Date of Peer Review: 07/10/2014.
Date of Acceptance: 30/10/2014.
Date of Publishing: 31/10/2014.