

Hemodynamic Effects of Iohexol and Diatrizoate Sodium (Radiocontrast Media): An Observational Study

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| Received: 24.12.2018 | Accepted: 06.01.2019 | Published: 18.01.2019

DOI: [10.36348/sjmpps.2019.v05i01.001](https://doi.org/10.36348/sjmpps.2019.v05i01.001)

Abstract

Aim: The aim of the study was to evaluate the hemodynamic effects of radio-contrast media i.e Iohexol and Diatrizoate Sodium in patients visiting the Radiology department for CT scan. **Methodology:** It was an observational study, conducted at Mahatma Gandhi Hospital Jodhpur (Rajasthan). Pulse rate and blood pressure were measured three to five times, before administration of Iohexol or Diatrizoate Sodium, after 5 min and 1 hr after administration of Iohexol and after 1 hr and 2 hr starting of administration of Diatrizoate Sodium. **Results:** 5 minutes post-Iohexol administration increased in SBP was observed in 66.66% and decreased SBP observed in 21% participants. While 58.66% participant's DBP decreased and 37.33% participant's DBP increased. 1 hr post-Iohexol administration in 44% individuals recorded fall in SBP and in 56% individuals recorded rise in SBP compare to the pre-Iohexol administration. 1-hour post-Iohexol administration, in 60% participants recorded decreased DBP and in 32% participant recorded rise in DBP. In 65.33% cases, PR increased within 5 minutes after Iohexol administration while 81.33% participant's PR was increased, 1 hr post-Iohexol administration. After 1 hr starting of Diatrizoate Sodium administration, decrease in SBP was recorded in 38.46% and increased in SBP recorded in 46.15% participants while incidence of decreased in DBP was in 38.46% cases and increased DBP was observed in 23.07% cases. 2 hr post Diatrizoate Sodium administration in 57.69% participants increased in PR observed. **Conclusion:** Post Iohexol administration SBP and PR were increased but DBP decreased. But these were clinically insignificant fall or rise in BP or PR except increased in PR 1 hr post-Iohexol compare to pre-Iohexol which was clinically highly significant. Post-Diatrizoate Sodium administration SBP and DBP were decreased whereas PR was increased compared to pre-Diatrizoate Sodium but this fall in BP and rise in PR is clinically insignificant.

Keywords: Iohexol, Diatrizoate Sodium, SBP, DBP, and HR.

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INTRODUCTION

Radiocontrast media are a substance used in different types of radiologic examinations to enhance tissue contrast and improve lesion detectability and characterization [1, 2]. Iodinated contrast media are the most commonly used contrast agent in diagnostic and interventional procedures. Iodinated contrast agents (ICAs) can be divided into two groups, ionic ICAs (IICAs) and non-ionic ICAs (NIICAs). Iohexol is the commonly used NIICA contrast media. Iohexol is non-ionic contrast medium developed by Nyegaard & Co., Oslo [3]. The chemical, toxicological and

pharmacological properties of Iohexol seem to be similar to those of Amipaque, the only non-ionic contrast medium approved first for routine clinical usage.

Radio Contrast media can be classified by their osmolarity. Hyperosmolar contrast media have as much as five times the osmolarity of plasma. Newer contrast agents, known as low-osmolar and iso-osmolar contrast media. low-osmolar contrast media have an osmolarity that is two or three times greater than that of plasma and

iso-osmolar contrast media have an osmolarity equal to plasma [4].

Non-ionic iodinated contrast media is currently the preferred option for enhanced CT examination. In recent years, the market sales of contrast media have been increasing in India, However, compared with the western countries, the market for contrast media in India is far from saturated. Many factors, including those related to influence the quality of cardiovascular computed tomographic (CT) images, contrast media injection, especially during electrocardiographically gated CT. Higher osmolarity of the contrast agent can affect a variety of physiologic parameters, including heart rate (HR) [5-7].

Contrast media (CM) should achieve a very high concentration in the tissues without producing any adverse effects. Unfortunately, this has not been possible so far and all CM have adverse effects [8]. The iodinated contrast agents used in diagnostic imaging are categorized according to their physical and chemical properties [9].

The use of diagnostic CT for abdominal and pelvic indications has proliferated greatly in the last two decades, and much research has been performed to determine the optimal technical parameters to maximize diagnostic accuracy [7, 8]. For many abdominal-pelvic CT indications, the bowel is opacified with a positive contrast agent administered orally. This helps to differentiate bowel from other soft tissue [10, 11] and allows better visualization of wall characteristics. However, administration of positive oral contrast frequently results in patient complaints of noxious taste and occasional nausea and vomiting.

METHODOLOGY

This study was an observational and noninterventional study, conducted at Mahatma Gandhi Hospital Jodhpur (Rajasthan) with the association of Department Pharmacology and Radiology. Total 75 patients were evaluated among them 45 were male and 30 were female. All 75 participants received Iohexol intravenously as a contrast media and 26 participants also received oral contrast media (Diatrizoate Sodium). Diatrizoate Sodium was given before Iohexol. Patients age between 18yrs to 75 yrs were included. Bedridden patients and pregnant female were excluded from the study. Diatrizoate Sodium 60 ml ampule was mixed in

2-liter water and patients were asked to drink it in 2 hours. Whereas Iohexol given intravenously just before CT scan was performed. Participants were divided into two groups - Group A and Group B. In group A, participants those receiving Iohexol were include and in group B participants those receiving both Iohexol (IV) and Diatrizoate Sodium (orally) were included. Monitoring of blood pressure and pulse rate made on basis of these group. In a group A, blood pressure and pulse rate monitored within 5 minutes before the Iohexol administration, after 5 minutes of CT scan performed and then 1 hour after CT scan performed. In group B, blood pressure and pulse rate were monitored, before the start of contrast media, 1 hr after starting oral contrast media, 2 hr after starting oral contrast media, before administration of Iohexol, 5 min after CT scan performed and 1 hr after CT scan performed.

RESULTS

A total number of patients examined and IV Iohexol was given in 75 patients, among them, 45 patients were male and 30 were female. Before giving the Iohexol systolic blood pressure (SBP) was measured and then it was measured again 5 min after the administration of Iohexol. When comparison of systolic blood pressure made between before administration of Iohexol and after 5 min post-Iohexol. Out of 75 patients, 21 patient's systolic blood pressure decreased, among them 11 were male and 10 were female and 50 patient's systolic pressure increased, among them, 32 were male and 18 were female. 4 patients found no change in the systolic blood pressure among them 2 were male and 2 were female (Table-1, Figure-1). So after 5 minutes post-Iohexol incidence of increased SBP was 66.66% and incidence of decreased SBP was 21% and incidence of no change in SBP after 5 min post-Iohexol was 5.33% shown in Figure-1 and Table-1.

Comparison of diastolic blood pressure made between before administration of Iohexol and after administration of Iohexol within 5 minutes. 44 patient's diastolic blood pressure decreased among them 25 were male and 19 were female and 28 patients increased the diastolic pressure among them 17 were male and 11 were female, 3 patients found no change in the diastolic blood pressure and all 3 were male. So in the above view, 58.66% participant's DBP decreased and 37.33% participant's DBP increased. Whereas 4% had no change in DBP, 5 min post-Iohexol (Table-2, Figure-2).

Table-1: Effect of I.V. Iohexol on early systolic blood pressure (within 5 min)

Sex	Decreased	Increased	No effect
Male	11(24.44%)	32(71.11%)	2 (4.44%)
Female	10(33.33%)	18(60%)	2(6.66%)
Total	21(28%)	50(66.66%)	4 (5.33%)

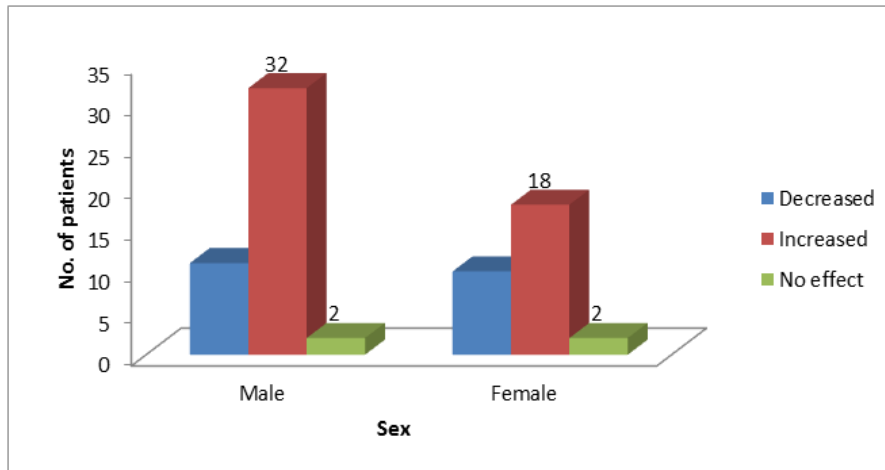


Fig-1: Effect IV Iohexol on early diastolic blood pressure (within 5 min). In the majority of patients, SBP was increased after administration of Iohexol within 5 minutes

Table-2: Effect IV Iohexol on early diastolic blood pressure (within 5 min)

Sex	Decreased	Increased	No effect
Male	25(55.55%)	17(37.77)	3(6.66%)
Female	19(63.33%)	11(36.66%)	0
Total	44((58.66%)	28(37.33%)	3(4%)

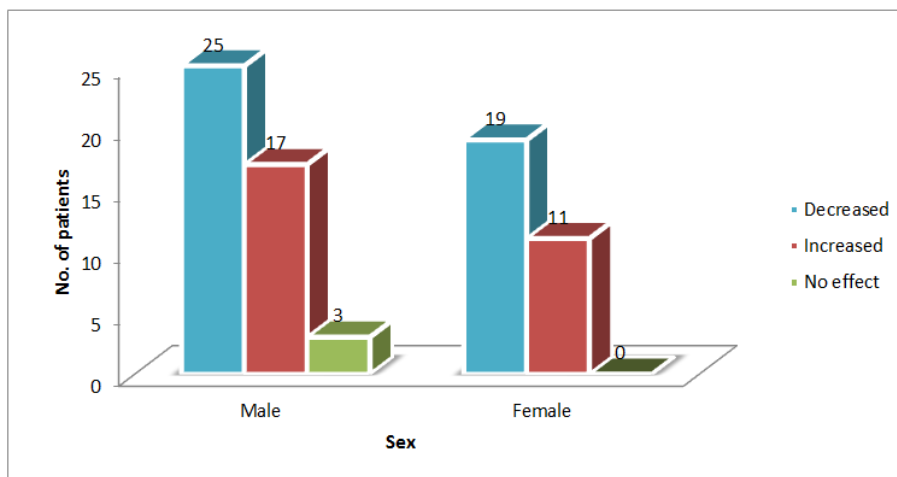


Fig-2: Effect IV Iohexol on early diastolic blood pressure (within 5 min). DBP decreased in the majority of patients after Iohexol administration within 5 minutes

Effect IV Iohexol on late systolic blood pressure (1 hr post-Iohexol) in comparison to pre-Iohexol and after 5 minutes of Iohexol administration:-

Effect of IV Iohexol on late systolic blood pressure (1 hr post Iohexol) in comparison to before administration of Iohexol (pre Iohexol) and 5 minutes post Iohexol administration was measured, Comparison of systolic blood pressure made between before administration of Iohexol and 1 hr after administration, 33 patient’s systolic blood pressure decreased, among them 18 were male and 15 were female and 42 patient’s systolic pressure increased, among them 27 were male and 15 were female. Then a comparison of systolic blood pressure made between administration of Iohexol in 5 minutes and 1 hr after administration, 35 patients recorded decrease in systolic blood pressure, among

them 22 were male and 13 were female and 36 patients recorded increased systolic pressure, among them, 21 were male and n15 were female. 4 patients found no change in the diastolic blood pressure among them 2 were male and 2 were female shown in table 3, after that Comparison of systolic blood pressure made between 1 hr after administration of Iohexol v/s before administration of Iohexol and after 5 minutes of Iohexol administration, 27 patient’s systolic blood pressure decreased, among them 17 were male and 10 were female, 23 patients systolic pressure increased, among them all 23 were male. So after 1 hr post-Iohexol administration 44% individuals recorded fall in SBP and 56% individual recorded rise in SBP compare to the pre-Iohexol administration (Table-3).

Table-3: Effect IV Iohexol on late systolic blood pressure (1 hr post-Iohexol) in comparison to pre-Iohexol and after 5 minutes of Iohexol administration

Sex	Fall (1hrs v/s Before)	Fall (1hrs v/s 5 min)	Rise (1hrs v/s Before)	Rise (1hrs v/s 5 min)	No effect (1hrs v/s Before)	No effect (1hrs v/s 5 min)	Fall (1hrs v/s Before & 5 min)	Rise (1hrs v/s Before & 5 min)	No effect (1hrs v/s Before & 5 min)
Male	18	22	27	21	0	2	17	23	0
Female	15	13	15	15	0	2	10	0	0
Total	33	35	42	36	0	4	27	23	0

Effect IV Iohexol on late diastolic blood pressure (1 hr post-Iohexol) in comparison to pre-Iohexol and after 5 minutes of Iohexol administration:-

Effect IV Iohexol on late diastolic blood pressure (1 hr post-Iohexol) in comparison to before administration of Iohexol (pre-Iohexol) and after 5 minutes of Iohexol administration in this process, Comparison of diastolic blood pressure made between before administration of Iohexol and 1 hr after administration. 45 patients recorded decreased diastolic blood pressure among them 25 were male and 20 were female, 24 patients recorded increased diastolic pressure among them 16 were male and 8 were female, 6 patient found with no change in diastolic blood pressure among them 4 were male and were female, then Comparison of diastolic blood pressure made between administration of Iohexol in 5 minutes and 1

hr after administration, 41 patient's diastolic blood pressure decreased, among them 27 were male and 14 were female, 29 patient's diastolic pressure increased, among them 17 were male and 12 were female, 5 patients found no change in the diastolic blood pressure among them 1 were male and 5 were female, after that Comparison of diastolic blood pressure made between 1 hr after administration of Iohexol v/s before administration of Iohexol and after 5 minutes of Iohexol administration, 33 patient's diastolic blood pressure decreased, among them 19 were male and 14 were female, 18 patient's systolic pressure increased among them 12 were male and 6 were female. So after 1-hour post-Iohexol administration in 60% (45) participants recorded decreased DBP, 32% (n=24) participant rise in the DBP whereas 8% (n=6) had no change in DBP shown in Table-4.

Table-4: Effect IV Iohexol on late diastolic blood pressure (1 hr post-Iohexol) in comparison to pre-Iohexol and after 5 minutes of Iohexol administration

Sex	Fall (1hrs v/s Before)	Fall (1hrs v/s 5 min)	Rise (1hrs v/s Before)	Rise (1hrs v/s 5 min)	No effect (1hrs v/s Before)	No effect (1hrs v/s 5 min)	Fall (1hrs v/s Before & 5 min)	Rise (1hrs v/s Before & 5 min)	No effect (1hrs v/s Before & 5 min)
Male	25	27	16	17	4	1	19	12	0
Female	20	14	8	12	2	4	14	6	0
Total	45	41	24	29	6	5	33	18	0

Effect of IV Iohexol on early pulse rate (within 5 min)

Comparison of pulse rate was made between before administration of Iohexol and after administration of Iohexol within 5 min. out of them, 33 patient's pulse rate decreased, among them 15 were male and 8 were female, 49 patient's the pulse rate

increased, among them 28 were male and 21 were female, 3 patients found the no change in the pulse rate among them 2 were male and 1 was female. 30.66% individual recorded decreased PR, 65.33% individual increased PR whereas in 4% individual didn't found any change in PR, after 5 minutes post-Iohexol (Table-5, Figure-3).

Table-5: Effect of IV Iohexol on early pulse rate (within 5 min)

Sex	Decreased	Increased	No effect
Male	15(33.33%)	28(62.22%)	2(4.44%)
Female	8(26.66%)	21(70%)	1(3.33%)
Total	23(30.66%)	49(65.33%)	3(4%)

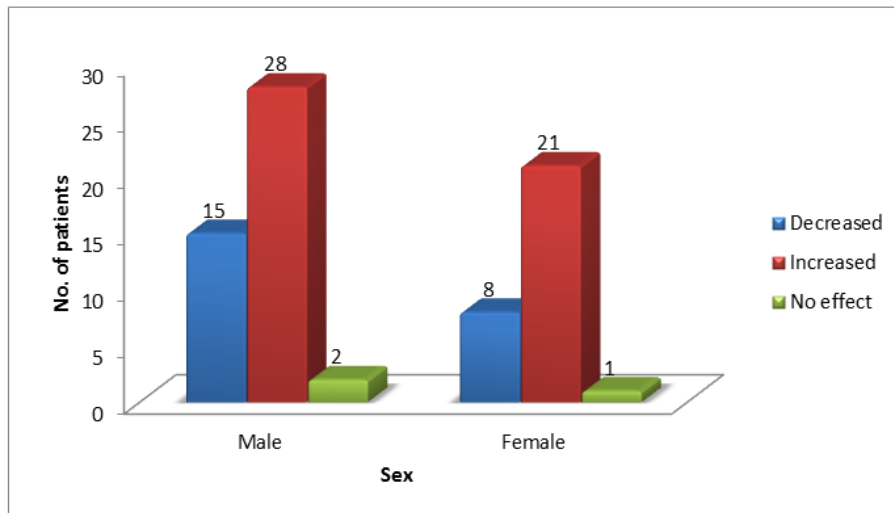


Fig-3: Effect IV Iohexol on early pulse rate (within 5 min). In majority case, PR increased within 5 minutes after Iohexol administration

Effect of IV Iohexol on late pulse rate (1 hr post-Iohexol) in comparison to pre-Iohexol and after 5 minutes of Iohexol administration:-

Effect IV Iohexol on late pulse rate 1 hr post-Iohexol) in comparison to before administration of Iohexol(pre-Iohexol) and after 5 minutes of Iohexol administration in this process, Comparison of pulse rate made between before administration of Iohexol and 1 hr after administration. 11 patient’s pulse rate decreased, among them 5 were male and 6 were female, 61 patients increased the pulse rate among them 39 were male and 22 were female, 3 patient found with no change in pulse rate among them 1 was male and 2 were female, then Comparison of pulse rate made between administration of Iohexol in 5 minutes and 1

hr after administration, 12 patient’s pulse rate decreased among them 4 were male and 8 were female, 57 patients increased the pulse rate among them 38 were male and 19 were female, 6 patients found no change in the pulse rate among them 3 were male and 3 were female, after that Comparison of pulse rate made between 1 hr after administration of Iohexol v/s before administration of Iohexol and after 5 minutes of Iohexol administration, 7 patient’s pulse rate decreased, among them 2 were male and 5 were female, 42 patient’s pulse rate increased, among them 28 were male and 14 were female. PR 1 hr post-Iohexol decreased by 14.66% patients, increased in 81.33% patients whereas in 4% of patients PR was not changed compared to the pre-Iohexol shown in table 6.

Table-6: Effect of IV Iohexol on late pulse rate (1 hr post-Iohexol) in comparison to pre Iohexol and after 5 minutes of Iohexol administration

Sex	Fall (1hrs v/s Before)	Fall (1hrs v/s 5 min)	Rise (1 hrs v/s Before)	Rise (1hrs v/s 5 min)	No effect (1hrs v/s Before)	No effect (1hrs v/s 5 min)	Fall (1hrs v/s Before & 5 min)	Rise (1hrs v/s Before & 5 min)	No effect (1hrs v/s Before & 5 min)
Male	5	4	39	38	1	3	2	28	0
Female	6	8	22	19	2	3	5	14	0
Total	11	12	61	57	3	6	7	42	0

After 5 min and 1 hr, Post-Iohexol administration mean SBP was increased compared to pre-Iohexol administration but it decreased after 1 hr Post Iohexol administration compares to after 5 Post Iohexol administration. But DBP was decreased Post Iohexol administration compare to the pre-Iohexol administration. While PR increased Post Iohexol administration compares to the pre-Iohexol administration. P- value by Pair T-test for a pulse rate of Before administering Iohexol IV vs After 1 hr of administering the Iohexol IV (P = 0.026) was highly significant and other comparisons it was insignificant.

While P- value for SBP and DBP in various comparisons was clinically insignificant.

Effect of Diatrizoate Sodium (oral) on systolic blood pressure after 1 hour:-

Total patients examined and Diatrizoate Sodium (oral) given to 26 patients, among them 11 patients were male and 15 were female. Before given the Diatrizoate Sodium systolic blood pressure (SBP) was measured and then measured 1 hr after the administration of Diatrizoate Sodium. When comparison of systolic blood pressure made between before administration of Diatrizoate Sodium and 1 hr

after administration of Diatrizoate Sodium. out of them, in 10 patient's systolic blood pressure decreased, among them 3 patients were male and 7 were female, 12 patients recorded increased systolic pressure among them 5 were male and 7 were female, 4 patients found no change in the systolic blood pressure among them 3

patients were male and 1 was female. The incidence of a decrease in SBP was in 38.46% (N=10), the increase was in 46.15% (n=12) and incidence of no change in SBP was in 15.38% after 1 hr Diatrizoate Sodium administration (Table 7, Figure-4).

Table-7: Effect of Diatrizoate Sodium (oral) on systolic blood pressure after 1 hour

Sex	Decreased	Increased	No effect
Male	3(27.27%)	5(45.45%)	3(27.27%)
Female	7(46.66%)	7(46.66%)	1(6.66%)
Total	10(38.46%)	12(46.15%)	4(15.38%)

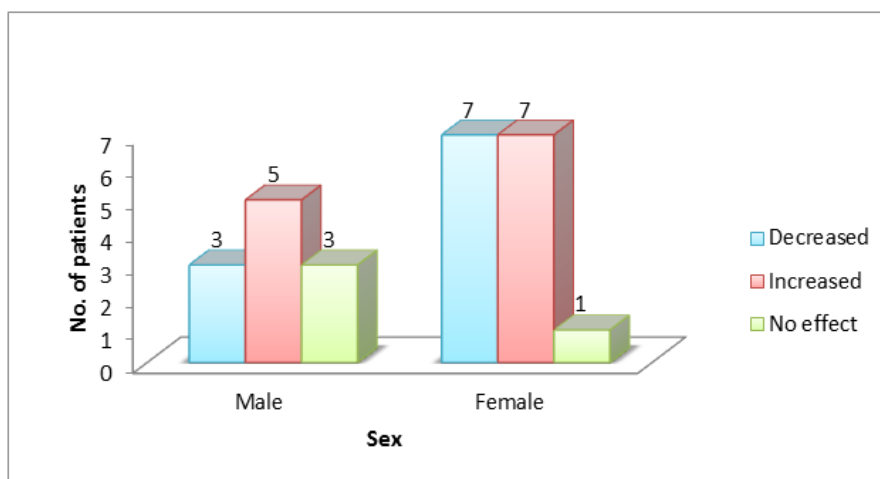


Fig-4: Effect of Diatrizoate Sodium (oral) on systolic blood pressure after 1 hour. No significant change in SBP 1 hr after administration of Diatrizoate Sodium

Effect of Diatrizoate Sodium (oral) on diastolic blood pressure after 1 hour

Comparison of diastolic blood pressure made between before administration of Diatrizoate Sodium and 1 hr after administration of Diatrizoate Sodium. Out of them, 10 patient's diastolic blood pressure decreased, among them 6 patients were male and 4 were female. In 6 patient's diastolic pressure increased, among them 3

patients were male and 3 were female, and 10 patients found no change in the diastolic blood pressure among them 2 patients were male and 8 was female. The incidence of decreased in DBP was in 38.46% (N=10), increased was in 23.07% (n=6) and incidence of no change in DBP in 38.46%(n=10) after 1 hr Diatrizoate Sodium administration shown in table 8 and figure 5.

Table-8: Effect of Diatrizoate Sodium (oral) on diastolic blood pressure after 1 hour

Sex	Decreased	Increased	No effect
Male	6(54.54%)	3(2.27%)	2(1.18%)
Female	4(26.66%)	3(20%)	8(53.33%)
Total	10(38.46%)	6(23.07%)	10(38.46%)

Effect of Diatrizoate Sodium (oral) on late systolic blood pressure (2 hr post-Diatrizoate Sodium) in comparison to pre-Diatrizoate Sodium (oral) and after 1 hour of Diatrizoate Sodium (oral) administration:-

Effect of Diatrizoate Sodium (oral) on late systolic blood pressure (2 hr post Diatrizoate Sodium) in compare to pre Diatrizoate Sodium(before Diatrizoate Sodium administration) and after 1 hour of Diatrizoate Sodium (oral) administration in this process, Comparison of systolic blood pressure made between before administration of Diatrizoate Sodium and 2 hr after administration. Systolic blood pressure decreased

in 11 patients among them 2 were male and 9 were female, increased in 12 patients, among them 7 were male and 5 were female, 3 patients found no change in the diastolic blood pressure among them 2 were male and 1 was female. Then Comparison of systolic blood pressure made between administration of Diatrizoate Sodium in 1hr and 2 hr after administration, 12 patients recorded decreased systolic blood pressure among them 4 were male and 8 were female, 9 patients recorded increased systolic pressure, among them 4 were male and 5 were female, 5 patients found no change in the diastolic blood pressure among them 3 were male and 2 were female. After that Comparison of systolic blood

pressure made between 2 hr after administration of Diatrizoate Sodium v/s before administration of Diatrizoate Sodium and after 1hr of Diatrizoate Sodium administration, 7 patient's systolic blood pressure decreased, among them 1 was male and 6 were female, 6 patient's systolic pressure increased, among them 3

were male and 3 were females and 1 male patient was not having change. Incidence of fall in SBP in 42.30% (n=11), rise in 46.15% (n=12) and no change in 11.53% (n=3) after 2 hrs post Diatrizoate Sodium administration compare to pre Diatrizoate Sodium (Table-9).

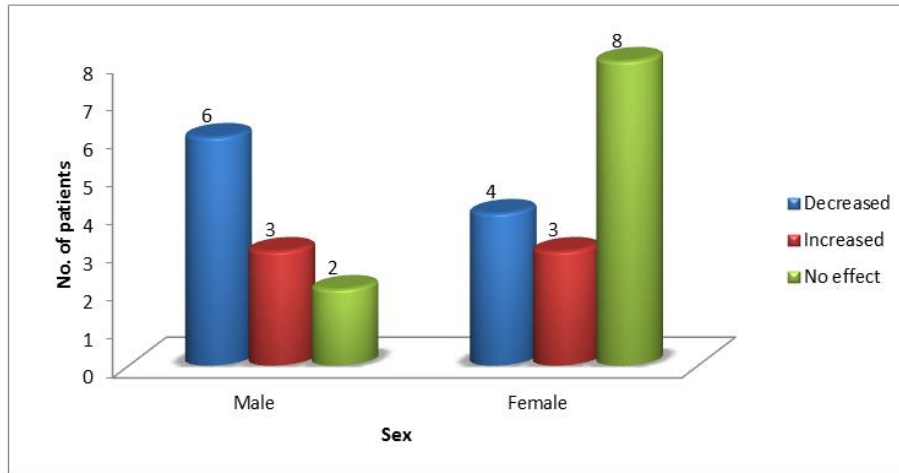


Fig-5: Effect of Diatrizoate Sodium (oral) on diastolic blood pressure after 1 hour. No significant change in DBP after 1 hr administration of Diatrizoate Sodium in female but in the majority of male DBP decreased

Table-9: Effect of Diatrizoate Sodium (oral) on late systolic blood pressure (2 hr post-Diatrizoate Sodium) in comparison to pre-Diatrizoate Sodium (oral) and after 1 hour of Diatrizoate Sodium (oral) administration

Sex	Fall (2hrs v/s Before)	Fall (2hrs v/s 1hr)	Rise (2hrs v/s Before)	Rise (2hrs v/s 1hr)	No effect (2hrs v/s Before)	No effect (2hrs v/s 1hrs)	Fall (2hrs v/s Before & 1hr)	Rise (2hrs v/s Before & 1hr)	No effect (2hrs v/s Before & 1hr)
Male	2	4	7	4	2	3	1	3	1
Female	9	8	5	5	1	2	6	3	0
Total	11	12	12	9	3	5	7	6	1

Effect of Diatrizoate Sodium (oral) on late diastolic blood pressure (2 hr post-Diatrizoate Sodium) in comparison to pre-Diatrizoate Sodium (oral) and after 1 hour of Diatrizoate Sodium (oral) administration

Effect Diatrizoate Sodium (oral) on late diastolic blood pressure (2 hr post Diatrizoate Sodium) in compare to before administration of Diatrizoate Sodium (pre Diatrizoate Sodium) and after 1 hr of Diatrizoate Sodium administration in this process, Comparison of diastolic blood pressure made between before administration of Diatrizoate Sodium and 2 hr after administration. The diastolic blood pressure of 10 patients decreased, among them 5 were male and 5 were female, of 6 patients the systolic pressure increased, among them 2 were male and 4 were female, 10 patients found no change in the diastolic blood pressure among them 4 were male and 6 were female. Then Comparison of diastolic blood pressure made between administration of Diatrizoate Sodium in 1hr

and 2 hr after administration, 5 patient's diastolic blood pressure decreased, among them 3 were male and 2 were female, 16 patients diastolic pressure increased, among them 6 were male and 10 were female, 16 patients found no change in the diastolic blood pressure among them 6 were male and 10 were female. After that comparison of diastolic blood pressure made between 2 hr after administration of Diatrizoate Sodium v/s before administration of Diatrizoate Sodium and after 1hr of Diatrizoate Sodium administration, 5 patient's diastolic blood pressure decreased, among them 2 were male and 3 were females, 2 patients diastolic pressure increased, among them 1 was male and 1 was female and 12 patients were not having change among 6 were males and 6 were females. Incidence of fall in DBP in 19.23%(n=5), rise in 23.07%(n=6) and no change in 38.46%(n=1) in 2 hrs post Diatrizoate Sodium administration compared to pre Diatrizoate Sodium (Table-10).

Table-10: Effect of Diatrizoate Sodium (oral) on late diastolic blood pressure (2 hr post-Diatrizoate Sodium) in comparison to pre-Diatrizoate Sodium (oral) and after 1 hour of Diatrizoate Sodium (oral) administration

Sex	Fall (2hrs v/s Before)	Fall (2hrs v/s 1hr)	Rise (2hrs v/s Before)	Rise (2hrs v/s 1hr)	No effect (2hrs v/s Before)	No effect (2hrs v/s 1hrs)	Fall (2hrs v/s Before & 1hr)	Rise (2hrs v/s Before & 1hr)	No effect (2hrs v/s Before & 1hr)
Male	5	3	2	2	4	6	2	1	6
Female	5	2	4	3	6	10	3	1	6
Total	10	5	6	5	10	16	5	2	12

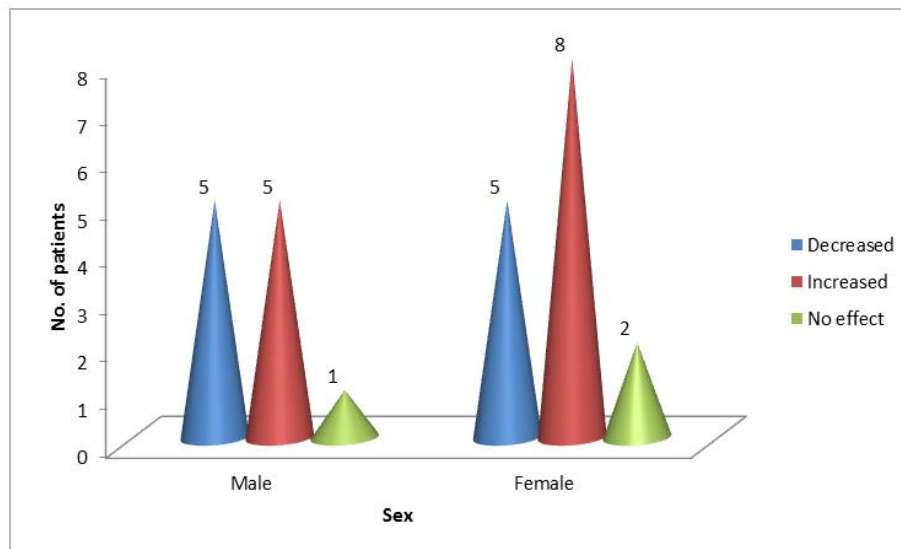
Effect of Diatrizoate Sodium (oral) on pulse rate after one hour:-

Total participants examined and Diatrizoate Sodium (oral) given was 26, among them 11 were male and 15 were female. Before giving the Diatrizoate Sodium pulse rate was measured and then it measured 1 hr after the administration of Diatrizoate Sodium. When comparison of pulse rate made between before administration of Diatrizoate Sodium and 1 hr after

administration of Diatrizoate Sodium, out of them, 10 patients recorded decreased the pulse rate among them 5 were male and 5 were female, 13 patients increased pulse rate among them 5 were male and 8 were female, 4 patients found no change in the pulse rate among them 1 was male and 2 were female. Incidence of fall in PR in 38.46% (n=10) and rise in PR in 50% (n=13) and no change in PR in 11.53% (n=3) (Table-11, Figure-6).

Table-11: Effect of Diatrizoate Sodium (oral) on pulse rate after one hour

Sex	Decreased	Increased	No effect
Male	5(45.45%)	5(45.45%)	1(9.09%)
Female	5(33.33%)	8(53.33%)	2(13.33%)
Total	10(38.46%)	13(50%)	3(11.53%)

**Fig-6: Effect of Diatrizoate Sodium (oral) on pulse rate after one hour. In the majority of patients pulse rate increased but no significant change in male patients****Effect of Diatrizoate Sodium (oral) on late pulse rate (2 hr post-Diatrizoate Sodium) in comparison to pre-Diatrizoate Sodium (oral) and after 1 hour of Diatrizoate Sodium (oral) administration:-**

Effect of Diatrizoate Sodium (oral) on late pulse rate (2 hr post Diatrizoate Sodium) in comparison to before administration of Diatrizoate Sodium (pre Diatrizoate Sodium) and after 1 hr of Diatrizoate Sodium administration in this process, Comparison of pulse rate made between before administration of Diatrizoate Sodium and 2 hr after administration. 10 patient's pulse rate decreased, among them 6 were male

and 4 were female, 15 patient's pulse rate increased, among them 5 were male and 10 were female, 1 male patient found with no change in pulse rate, then Comparison of pulse rate made between administration of Diatrizoate Sodium in 1 hr and 2 hr after administration, 13 patient's pulse rate decreased, among them 6 were male and 7 were female, 9 patients increased the pulse rate among them 2 were male and 7 were female, 3 male patients found no change in the pulse rate. After that comparison of pulse rate made between 2 hr after administration of Diatrizoate Sodium v/s before administration of Diatrizoate Sodium and

after 1 hr of Diatrizoate Sodium administration, 7 patient's the pulse rate decreased, among them 4 were male and 3 were female, 7 patient's pulse rate increased, among them 1 was male and 7 were female.

After 2 hr post-Diatrizoate Sodium In 38.46% patients PR decreased, in 57.69% increased and in 3.84% patients, no change in pulse compare to the pre-Diatrizoate Sodium (Table-12).

Table-12: Effect of Diatrizoate Sodium (oral) on late pulse rate (2 hr post-Diatrizoate Sodium) in comparison to pre-Diatrizoate Sodium (oral) and after 1 hour of Diatrizoate Sodium (oral) administration

Sex	Fall (2hrs v/s Before)	Fall (2hrs v/s 1hr)	Rise (2hrs v/s Before)	Rise (2hrs v/s 1hr)	No effect (2hrs v/s Before)	No effect (2hrs v/s 1hrs)	Fall (2hrs v/s Before & 1hr)	Rise (2hrs v/s Before & 1hr)	No effect (2hrs v/s Before & 1hr)
Male	6	6	5	2	0	3	4	1	0
Female	4	7	10	7	1	0	3	6	0
Total	10	13	15	9	1	3	7	7	0

Post-Diatrizoate Sodium administration mean SBP and DBP for study patients were decreased compared to the pre-Diatrizoate Sodium administration. While mean PR for study patients after Diatrizoate Sodium administration increased compare to the pre-Diatrizoate Sodium but mean PR mildly decreased after 2 hr Diatrizoate Sodium administration compare to the 1 hr post-Diatrizoate Sodium.

DISCUSSION

The aim of the study was to evaluate the hemodynamic effects of radio-contrast media i.e Iohexol and Diatrizoate Sodium, (as these are the most commonly used agents in government setup) on pulse rate and blood pressure, for this, we evaluate the 75 patients.

In our study, we found that Post Iohexol administration SBP increased but this increased in SBP was clinically insignificant. On comparing the effect of Iohexol on late SBP (after 1 hr) with that of pre-Iohexol administration, it was seen that a significant percentage of patients had increased level of SBP. Whereas comparing late SBP with that of 5 minutes post administration showed that almost half the patients had increased and other half had decreased SBP, while few had no effect. On comparing the effect of Iohexol on late DBP with that of pre-Iohexol administration it was seen that a significant number of patients had fall in DBP and a similar effect was observed on comparing late DBP (1 hr post administration) with that of 5 minutes post-Iohexol administration. In contrast to our study, Hualong et al found in their study that an early moderate postprocedural decrease in SBP may increase the risk of Contrast-Induced Nephropathy in patients undergoing Percutaneous Intervention [12].

In the present study, post-Diatrizoate Sodium administration SBP and DBP were decreased and this decreased in SBP and DBP clinically insignificant. Further on comparing the effect of Diatrizoate Sodium on late SBP with that of pre-Diatrizoate Sodium level, it was seen that almost 50% of patient had increased and others had decreased in late SBP. Whereas late DBP

decreased in the significantly higher number of patients. Knoepp *et al.*, confirmed in their study that Gd^{3+} -release from linear Gd-DTPA and indicated that the released Gd^{3+} amount is sufficient to interfere with ENaC's activity which is directly related to elevated blood pressure [13].

In present study post-Iohexol administration PR (pulse rate) was increased, among this 1 hr post-Iohexol administration compares to a pre-Iohexol, increase in PR was clinically highly significant, whereas increased in PR compare to pre-Iohexol and 5 min post-Iohexol administration was clinically insignificant. Whereas post-Diatrizoate Sodium PR was increased compare to pre-Diatrizoate Sodium and this increased in PR was clinically insignificant.

Similar to our study Chartrand-Lefebvre *et al.*, recorded in their study that High-rate intravenous administration of iopamidol and iodixanol during pulmonary CT angiography slightly increased HR but there was no difference in HR between the different contrast agent groups [14]. Similarly, Missri J *et al.*, found in their study that low osmolar nonionic contrast media increase the HR and have the chance of serious arrhythmias [15]. Morris TW *et al.*, Besjakov J *et al.*, Misumi K *et al.*, Jynge P *et al.*, and Jacobsen EA *et al.*, showed in their study that the electrolyte composition of Contrast media formulations has arrhythmogenic potential and this was demonstrated by them in animal models [16-20].

During this study one female patient after Iohexol administration got syncope and on examination, her BP was drastically decreased (hypotension) and pulse was very high so she admitted in emergency and recovered in four hrs. So, in summary, we can say that after using contrast media, pulse rate and blood pressure should be monitored strictly for every patient at regular interval at least for one hr.

Limitation of study

Data of the study was very small so for final conclusion need another study with a large amount of data.

Acknowledgments

The authors express their thanks to the Dr. Amreesh Parvez, Faculty of life sciences and biotechnology, South Asian University, New Delhi and Dr Parul Chaturvedi senior resident, Department of Microbiology, S.M.S. Medical College, Jaipur for their technical support and staff of the Department of Radiology, Mahatma Gandhi Hospital, Jodhpur Affiliated with Dr, S. N. Medical College, Jodhpur (Rajasthan) for their assistance in conducting the study.

Conflict of Interest

The authors declare that no conflict of interest, financial or otherwise exists.

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