Original Article

Clinical Spectrum and Predictive Risk Factors for Infections in Children with Nephrotic Syndrome

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ABSTRACT

Introduction: Our study aimed to study the incidence of major infections in nephrotic syndrome & the risk factors for major infections & their etiological spectrum.

Methods: This was an observational study to find out the incidence of major infection in all cases of nephrotic syndrome who were admitted with either first attack or relapse of nephrotic syndrome from November 2016 to October 2017 (1 year) at tertiary care centre attached with SMIMER medical college.

Results: Prevalence of nephrotic syndrome was 1.0 % from all indoor admissions at out centre. Our study showed that one third of the patients with nephrotic syndrome had major infection. In our study cases of nephrotic syndrome presented at mean age of 6.40 ± 3.34 years. There was a preponderance of nephrotic syndrome in male (1.1:1). Epidemiologically major infections in nephrotic syndrome was more common in age group of 1-5 years & mainly in male children (1.3:1). In present study, 65% of cases showed presence of anemia. Mean hemoglobin level was low with statistical significance in patients with major infection.

Conclusion: Our study showed that one third of the patients with nephrotic syndrome had major infection. The mean value of serum protein & serum albumin was low in children with major infection with statistical significance as compared to children without infection. Cholesterol, triglyceride, HDL & LDL level were low with statistical significance in children with major infection. Patients with past history of infection were more likely to have major infections. Most common major infection was pneumonia followed by UTI. Most common chest radiograph finding in pneumonia was patchy consolidation. Most common organism causing UTI was E. coli & Klebsiella.

Key words: nephrotic syndrome, major infection, glomerulopathy

INTRODUCTION

Nephrotic syndrome is the most common glomerulopathy in childhood with a prevalence of approximately 2-7 per million population. Its prevalence in Asians is six times higher.[1]

Infections are an important complication in children with nephrotic syndrome especially in a developing country like India, being the commonest cause of mortality and significant morbidity in children with nephrotic syndrome.[2]

The increased prevalence of infections in patients with NS is variously ascribed to immunoglobulin loss in the urine[3,4], defective T-cell function, presence of ascites and relative malnutrition.[5]

Infectious episodes in nephrotic patients are responsible for high morbidity and can also cause an inadequate response to corticosteroid therapy and recurrences among patients in remission.[6]

Incidence of infections in nephrotic syndrome is varied in different studies from India and range from 19-36.6%.[7,8] Therefore it is essential to know the current trend of prevalence of infection in children with nephrotic syndrome and the organisms prevalent in our set up to decide about appropriate antibiotics. Gulati et al[3] have reported a prevalence of major infection at 38%, while 35% was reported by Payyadakk Ajayan et al.[7]

There is paucity of literature regarding the clinical spectrum of major infections in childhood NS from developing countries in recent years. Knowledge of these parameters has therapeutic and preventive relevance.[3] With this background, our study aimed to study the incidence of major infections in NS & the risk factors for major infections & their etiological spectrum.

METHODS

This was an observational study to find out the incidence of major infection in all cases of nephrotic syndrome who were admitted with either first attack or relapse of nephrotic syndrome from November 2016 to October 2017 (1 year) at tertiary care centre attached with SMIMER medical college. This study was done to correlate nephrotic syndrome with Major risk factors. Children with nephrotic syndrome from age 1-17 years including both male and female were eligible to participate in study.

Patient with first attack or relapse of nephrotic syndrome who were admitted for any complaint like facial edema, loose motion, breathing difficulty, fever, burning micturition, decreased urine output, pain in abdomen, cough & cold etc were enrolled in study. Known cases of nephrotic syndrome with features suggestive of major infection, were also included in the study. Patients aged more than 18 years

and NS cases with impaired renal function, macroscopic hematuria, uncontrolled hypertention and congenital renal anomalies were excluded.

Demographic data and historical data were collected, elaborate clinical examination of patients was done and they were investigated with haematological investigation like CBC, RFT, lipid profile, and urine analysis for microscopic examination and for culture sensitivity pattern as well as other relevant investigation was done as patient's condition demanded. All information was recorded on a preformed questionnaire and patient record sheet. The study was approved by ethical committee of our university and informed written consent was taken from the parents of each participant before enrolment.

Diagnostic criteria for major injections are as follow:

1) Peritonitis: Abdominal pain, tenderness, distension, diarrhoea, or vomiting, with ascetic fluid >100 leukocytes/mm3 and minimum 50% neutrophils and/ or positive culture.
2) Pneumonia: fast breathing and chest in drawing with chest X-ray confirmation.
3) Urinary tract infection (UTI): Bacterial colony count of $>10^5$ organisms/mL in a clean-catch midstream urine sample with fever (>38.5ºC), dysuria or increased urination frequency.
4) Cellulitis: Erythema, warmth, swelling, fever and local tenderness in any body part.
5) Meningitis: Fever and one of the following: neck rigidity, altered sensorium, seizures, with confirmation by cerebrospinal fluid cytology, biochemistry and culture.

Identification of the organisms to species level was done by standard biochemical methods. Urine culture was done to study in vitro antibiotic sensitivity pattern of isolated organism. Treatment of all patients started with 3rd generation of cephalosporin (cefotaxime/ceftriaxone) and Treatment was as per routine protocol for nephrotic syndrome, UTI and other infection. After identification of organism on urine culture/blood culture/swab culture/CSF culture/pleural fluid culture report,antibiotic were changed according to sensitivity and antibiotics were continued for 10 -14 days.

Qualitative variable expressed as percentage, while quantitative variable expressed as mean±SD. For comparison of two independent continuous variable applied independent t-tests & to know the association in between prevalence of two qualitative variable we applied Pearson chi-square test with Yates correction and fisher exact test. In this study level of significance consider as 5%. All analysis was done by SPSS 16 and open EPI software.

Sample size is calculated by considering the prevalence of Nephrotic syndrome by 1 month pilot survey in Department of Pediatrics , as P=proportion of nephrotic syndrome by one month study=1.5%, q = 1 – p with 95% level of significance (Z alpha / 2 = 1.96) with allowable error as 4% (L), $n = (Z \text{ alpha} / 2)^2 pq / L^2$, **n = 37.**

For statistical analysis patients of all nephrotic syndrome were divided into 2 groups: group 1 – major infection present and group 2- major infection absent and analysis for demographic data, historical data, clinical characteristics and investigative data was done.

RESULTS

In our study total 42 patients were enrolled aged from 1 year to 18 years. out of this 14 patients were in Group 1 (nephrotic syndrome with major infection) and 28 patients were in group 2 (nephrotic syndrome without major infection).

Mean age of nephrotic syndrome was 6.04±3.34 years, where as in group 1 mean age 6.40±3.34 years and in Group 2 mean age was 6.43±3.38 years. In our study, Half of the total patients belonged to 1-5 years age group, 30% belonged to 5-10 years age group, where as 20% patients were >10 years. In group 1 ,46% of the total patients belonged to 1-5 years age group, followed by 32% in 5-10 years age group & 22% patients were >10 years.

Table 1: Age distribution & Gender distribution in nephrotic syndrome

	Group 1		Group 2		Total		P value	
	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)	Male	female
1-5	4 (66)	4 (50)	8 (50)	5 (41)	12 (60)	9 (45)	1 (Ref)	1 (Ref)
6-10	2 (33)	3 (37)	5 (31)	4 (33)	7 (35)	7 (35)	0.82	0.94
>10	0 (0)	1 (12)	3 (18)	3 (25)	3 (15)	4 (20)	0.26	0.51
Total	6	8	16	12	22	20		

Table 2: Symptoms in nephrotic syndrome of two group

Symptoms	Group 1 (%)	Group 2 (%)	Total (%)	P value	Odd ratio	95% CI
Fever	14 (100)	13 (46)	37 (88)	0.01	33.29	1.81-612.5
Anasarca	13 (92)	25 (89)	38 (90)	0.71	1.56	0.14-16.52
Cough	5 (25)	8 (28)	13 (30)	0.63	1.38	0.35-5.44
abdominal pain	3 (21)	7 (25)	10 (35)	0.79	0.81	0.17-3.80
loose motion	1 (7)	2 (7	3 (10)	1.00	1.00	0.08-12.07
breathing difficulty	4 (28)	0 (0)	4 (14)	0.03	24.42	1.20-493.73
Wheeze	3 (21)	1 (3)	4 (14)	0.09	7.36	0.68-78.71
Vomiting	4 (28)	2 (7)	6 (21)	0.08	5.2	0.81-32.98
Headache	1 (7)	1 (3)	2 (7)	0.61	2.07	0.12-35.89
dysuria	4 (28)	1 (3)	5 (17)	0.36	0.35	0.03-3.36

CI= confidence interval

Table 3: Comparison of two groups on prednisolone treatment (>1 month) and past h/o infection

	Group 1 (n=14)	Group 2 (n=28)	Total (n=42)	P value
Prednisolone treatment				
Yes	6	14	20	0.66
No	8	14	22	
Past history of infection				
Present	7	5	14	0.02973
Absent	7	23	28	

Table 4: comparison of hematological parameter between two group

Investigation	Group 1 (n=14)	Group 2 (n=28)	P value
Hemoglobin	9.43 ±0.88	12.07±1.67	<0.01
Total count	14300±5625	9525±2989	<0.01
Platelet count	3.54±1.18	3.68±1.48	0.7598
Serum protein	3.45±0.77	4.26±0.83	<0.01
Serum albumin	1.62±0.27	2.04±0.65	0.0262
A/G ratio	0.75±0.17	0.92±0.22	0.0153
Serum urea	26.92±15.39	22.68±8.51	0.2551
Serum creat	0.52±0.17	0.56±0.26	0.6053
Cholesterol	448±88	350±89	<0.01
Triglyceride	301±99	231±104	0.0431
HDL	58±8	44±9.5	<0.01
LDL	237±34	180±42	<0.01

Table 5: comparison of C-reactive protein, Urine albumin, Urine Protein and h/o hypertension between two group

Variables	Group 1 (n=14)	Group 2 (n=28)	P value
C reactive protein			
Positive	11	8	<0.01
Negative	3	20	
Urine albumin			
>3	11	21	0.7978
<3	3	7	
Urine protein			
Wardside	2.78±1.05	3.03±0.85	0.31
laboratory	3.14±0.77	3.06±0.92	0.89
Hypertension			
Present	4	3	0.14
Absent	10	25	

Table 6: comparison of abdominal ultrasound between two group

USG Abdomen	Group 1 (n=14)	Group 2 (n=28)	Total
Ascites	3 (21)	5 (17)	18 (42)
Pleural effusion	4 (28)	2 (7)	6 (14)
Medical renal disease	3 (21)	3 (10)	6 (21)
NAD	5 (35)	14 (50)	19 (45)
Hepatomegaly	-	3 (10)	3 (7)

Figure in the parenthesis indicate percentage.

In group 2 , 1-5 year age group was largest with 57% of total patient, followed by 28% in 5-10 year age group & 15% patients in >10 years.

We were having slight male preponderance in our study. 52% cases were male while 48% cases were female. Male preponderance was more in 1-5 years age group while 6-10 year & >10 years age groups had almost equal number patients of both genders. In present study, 1-5 years age group predominated in female gender. Mean age of female patient in nephrotic syndrome was 6.40±3.34 years. In group 1, 50% cases belonged to 1-5 age group while 37% patients were in 6-10 years group. In group 2, 1-5 years age group accounted 41% cases, followed by 33% patients in 6-10 years group. 1-5 years age group was most common in male patients with 60% of all patients. Mean age of male patients with nephrotic syndrome 6.33±3.30 years.

Difference in age of disease of onset between two groups was statistically not significant. (p value 0.53) Mean hospital stay in group 1 was 9.57±2.62 days while it was 5.50±1.49 days in group 2. In our study, patients with major infection required statistically significant longer hospital stay at compared to patient without Infection. (p value <0.01)

The most common presentation at the time of admission was anasarca (edema) seen in 90% patients, followed by fever in 88% cases. All the patients (100%) in group 1 presented with fever while only 46% cases in group 2 presented with fever. Anasarca (edema) was seen in 92% patients in group 1 whereas 88% patients in group 2 had anasarca.

Our study did not show prednisolone treatment as a risk factor for major infection. Our study showed patients with past history of infection were more likely to have major infections as compared to patients without past history of major infection. **(Table 3)**

S. protein , S. albumin & A/G ratio showed statistically significant difference between group 1 & Group 2. S. cholesterol, S.triglyceride, HDL & LDL also showed statistically significant difference between group 1 & Group 2. **(Table 4)**

Our study showed CPR as statistically significant factor between group 1 & group 2. Positive CPR was strongly associated with Group 1. (Odd ratio: 36.66) In our study, no statistically significant difference in urine protein was found between two groups. Ward side urine protein & laboratory urine protein results were comparable in both group 1 & group 2 (statistically not significant). Our study showed Ward-side Urine protein are reliable even in presence of major infection. Our study showed 16% cases were having hypertension at the time of presentation which is comparable to study by Gabban A.I. et al. **(Table 5)**

Mean of Urine protein creatinine ratio in group 1 was 23.64 & in group 2 was 18.34, difference in mean of two group was statistically not significant. (p value 0.10)

In our study most common Ultrasound abdomen finding was NAD (45%) closely followed by ascites (42%) Pleural effusion was the most common finding in group 1 while NAD was most common finding in Group 2.

In our study the most common clinical type of nephrotic syndrome was 1st attack of nephrotic syndrome (38%) followed by IFRNS (33%). In Group 1, the most common clinical type of nephrotic syndrome was IFRNS (50%) followed by1st attack of nephrotic syndrome (35%) whereas 1st attack & IFRNS were at equal number (32%) in Group 2. **(Table 7)**

Table 7: comparison of Type of Nephrotic syndrome in two group

	Group 1 (n=14)	Group 2 (n=28)	Total
1st attack	5 (35)	9 (32)	16 (38)
IFRNS	7 (50)	9 (32)	14 (33)
FRNS	1 (7)	8 (28)	9 (21)
Steroid dependant	1 (7)	2 (7)	3 (7)

Figure in the parenthesis indicate percentage.

Table 9: comparison of chest radiograph finding in cases of pneumonia

Chest xray finding	Cases (%)
patchy consolidation	3 (50)
Lobar consolidation	2 (33)
Parapneumonic effusion	1 (17)

Most common major infection in our study was pneumonia accounting for 42% cases. Studies from India and other south east Asian countries. Second most common infection was UTI seen in 35% cases. Peritonitis & cellulitis had 14% cases each whereas we did not encounter with any case of meningitis in our study. 1 patient was having 2 major infection together (pneumonia with UTI). 12 patients had infections other than major infections, out of 12, 9 patients were in group 1. (75%) while 3 patients falling in group 2, were having multiple infections together (25%). Various studies have shown Upper respiratory infections are the most common infection in nephrotic syndrome. **(Table 8)**

Most common chest radiograph finding was patchy consolidation (50%) All 6 patients were initially started with amoxicillin + clavulanate (90 mg/kg/day) treatment as 1st line antibiotics. Only 1 patient required 2nd line antibiotic e.g. vancomycin (40 mg/kg/day). Peritonitis usually occurs within the first 2 years of diagnosis of nephrotic syndrome.[8] Both the cases of peritonitis in our study were also presented within 2 years of diagnosis of nephrotic syndrome.

In our study, E. coli & klebseilla both had equal number of UTI cases (2) whereas pseudomonas was seen in urine culture report of 1 patient.

Table 8: Comparison of patient's profile in different infection

	Pneumonia	UTI	Peritonitis	Cellulitis	Meningitis
No of cases	6	5	2	2	0
Age	4.42±1.98	5.5±2.58	7	12	-
Male:female	2:1	1:1.5	1:1	1 female	-
Hemoglobin	9.02±0.71	9.44±0.99	9.3	10.6	-
TLC	13971±5368	12050±5745	18200	7800	-
Platelet	3.53±1.45	3.13±0.88	3.6	4.59	-
CRP	100%	80%	100%	0%	-
Serum protein	3.5±0.82	3.78±0.52	2.85	2.1	-
Serum albumin	1.64±0.33	1.55±0.25	1.35	1.8	-
S.Cholesterol	466±75	444±97	370	536	-
MC clinical type of nephrotic syn.	IFRNS	IFRNS/1st attack	IFRNS	IFRNS	-

E. coli was showing 100% sensitivity to ciproflox, levoflox & netilmycin while 50% sensitivity to nitrofurantoin & ceftazidime. E. coli was resistant to cotrimoxazole. Klebsella showed 100% sensitivity to ciproflox, levoflox ,netilmycin & nitrofurantoin, whereas 50% sensitivity to tetracyclin. Pseudomonas was sensitive to ciproflox, levofox & nitrofurantoin.

DISCUSSION

This study was done in tertiary care centre attached to a medical college to find out the incidence of major Infections in NS and the risk factors for major infections & their etiological spectrum. On comparing with other studies, our results are as follows:

In our study patient age ranged from 1-17 years. Even through commonly nephrotic syndrome seen in pre-school children, in our study the mean age was 6.4±3.3. P Senguttuvan et al[10] took patient up to 12 years of age. While P. Ajayan et al[7] and Krishnan et al[9] showed similar mean age of presentation as in our study.

In our study mean age of presentation of nephrotic syndrome in female child was 6.4±3.3 which is similar to both other studies.

Table 10 : comparison of Mean age of all nephrotic syndrome patient:

	Mean age (years)
Our study	6.4±3.3
P. Ajayan et at[7]	6.8 ± 3.5
Krishnan et al[9]	6.79±2.12
P Senguttuvan et al[10]	5.95

Table 11: Comparison of infection in different studies

	Our study	Ajayan et al[7]	Krishnan et al[9]
Peritonitis	2(14)	14 (37.8)	4 (8.3)
Pneumonia	6(42)	13 (35.1)	20 (41.7)
Urinary tract infection	5(35)	3 (8.1)	12 (25)
Cellulitis	2(14)	3 (8.1)	2 (4.2)
Meningitis	0(0)	1(2.7)	-
Herpes zoster	1(7)	1(2.7)	-
Osteomyelitis	-	1 (2.7)	-
Disseminated varicella	-	1 (2.7)	-
Pulmonary TB	1(7)	-	1 (2.1)

Figure in the parenthesis indicate percentage.

Similarly mean age of presentation of nephrotic syndrome in male child was 6.42±3.35 matching to findings in other studies. Our study showed marginal male preponderance, similar result was seen with Ajayan et al[7] study. While Krishnan et al[9] & Ohri A et al[11] studies have shown even higher male preponderance

Most common clinical type of nephrotic syndrome in our study was 1st episode which is similar to result in study by P. Ajayan.[7] Infrequent relapsing nephrotic syndrome was 2nd most common clinical type, again matching to study by p. Ajayan.[7]

In our study , incidence rate of major Infection in nephrotic syndrome was 33.3 % which is similar to study by P Ajayan et al[7], where major infection incidence rate was 36.6% while study by Krishnan et al[9] showed much lower rate of infection at 19.6%.

In our study, most common infection was pneumonia (42%) matching with result of study by Krishnan et al[9] (pneumonia-41.7%). which is in contrast to result by Ajayan et al[7] which showed peritonitis (37.8%) as the most common infection. Our study showed UTI as second most common infection (35%), similar to study by Krishnan et at[9] (UTI: 25%) while study by Ajayan et al[7] study showed only 8.1% UTI cases.

In our study, mean Hb (gm/dl) in Group 1 was 9.43 ±0.88 and in group 2 mean Hb (gm/dl) was 12.07±1.67. Our study showed blood urea level lower in group 1 as compared to group 2 , which is in contrast to study by P Senguttuvan et al[10] where urea level are higher in group 1. In our study we have found, S. creatinine level difference between 2 groups was statistically insignificant .this result is consistent with study by S. Gulati et al[3] & p Senguttuvan et al.[10] In our study mean s. creatinine was 0.52±0.17 in group 1 & 0.56±0.26 in group 2 which lower than study by P Senguttuvan et al[10] (0.68±0.5 in group 1 & 0.7±0.35 in group 2) and study by S Gulati[3] (0.98±0.77 in group 1 & 1.15±1.35 in group 2) In our study total protein was 4.26±0.83 in group 1 & 3.45±0.77 in group 2 which is statistically significant. Similar result was shown in study by P Senguttuvan et al[10] & study by S Gulati.[3] Our study showed statistically significant difference in level of S. albumin between group 1 & group 2, our result is similar to result by P Senguttuvan et al[10] study & S Gulati et al[3] study. In our study, Serum cholesterol level were higher in group 1 as compared to group 2 which is statistically significant. Similar result seen in study by S Gulati et al[3] while study by P Senguttuvan et al[10] showed difference in s. cholesterol level between two group was not statistically significant.

In our study, E. coli & Klebsiella were most common organism causing UTI with equal numbers of cases while P Senguttuvan et al[10] study showed E.coli as most common organism associated with UTI.

Our study did not find any case of UTI caused by Gram positive whereas study by S.I. Adeleke et al[12] showed Staphycoccal as most common organism associated with UTI.

CONCLUSION

Prevalence of nephrotic syndrome was 1.0 % from all indoor admissions at out centre. Our study showed that one third of the patients with nephrotic syndrome had major infection. Epidemiologically major infections in nephrotic syndrome was more common in age group of 1-5 years & mainly in male children (1.3:1). In present study, 65% of cases showed presence of anemia. Mean hemoglobin level was low with statistical significance in patients with major infection. The mean value of serum protein & serum albumin was low in children with major infection with statistical significance as compared to children without infection. Cholesterol, triglyceride, HDL & LDL level were low with statistical significance in children with major infection. Patients with past history of infection were more likely to have major infections. Most common major infection was pneumonia followed by UTI. Most common chest radiograph finding in pneumonia was patchy consolidation. Most common organism causing UTI was E. coli & Klebsiella.

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Original Article

A Study on Correlation between HbA1C and Serum Lipid Profile among Type 2 Diabetes Mellitus

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ABSTRACT

Objective: To study correlation between HB1C and serum lipid profile among type 2 diabetes mellitus.

Methods: The cross-sectional study was carried out on 146 patients above the age of 30 years presenting with type 2 diabetes in OPD/wards of medicine department at Tertiary Care Center, South Gujarat.

Result: In study the parameters Fasting blood sugar (FBS), Glycated hemoglobin (HB1AC), triglycerides (TG), total cholesterol (TC), high density lipoprotein (HDL), low density lipoprotein (LDL), very low-density lipoprotein (VLDL)were studied. LDL, TC, were high in poor glycemic control group (HB1C>7) as compared to good glycemic control group (HB1C<7), HDL is significantly low in poor glycemic control group.

Conclusion: HB1AC is significantly correlated with lipid profiles. Type 2 diabetic patients are more prone to dyslipidaemia. Hba1c is significantly correlated with lipid profiles. So hba1c can be used as an indirect indicator of dyslipidaemia in type 2 diabetes in addition to as glycemic control biomarker.

Keywords: Type 2 diabetes mellitus, HB1AC, lipid profile

INTRODUCTION

In the ancient Sanskrit Indian literature, Diabetes Mellitus (DM) was described as "honey-urine disease" and has been associated with gross emaciation and wasting. Type 2 DM comprises a cluster of common metabolic disorders. It is a global endemic having a rapidly increasing prevalence in developing countries.[1] Diabetes mellitus is becoming more and more prevalent in our country India, it is estimated that approximately around 2% of the Indian population i.e around 15 million peoples are suffering from diabetes and the number of cases is said to be alarmingly rising day by day by around 5%-6% each year. Also, an estimated 300,000 peoples die from diabetes due to its severe complications because of uncontrolled hyperglycemia. There are around 3.5 crore diabetic patients in India and the number will rise up to 5.2 crores by 2025.[2] Keeping in view of the alarming increase in the incidence and prevalence of diabetics in India, WHO has declared the developing country, India as the –Diabetic Capital of the World.[3]Glycated hemoglobin (HbA1c) is routinely used as a diagnostic tool for screening and measuring long term control in diabetic patient. It is an indicator for the mean blood glucose level in diabetic patients, HbA1c predicts the risk for the development of severe diabetic complications in diabetic patients. The UKPDS study has shown that, in patients with Type 2 diabetes mellitus, the risk of diabetic complications were strongly associated with uncontrolled hyperglycemia. Control of hyperglycemia with decreased level of HbA1c is likely to reduce the risk of severe complications.[4] Thus, the study was planned to observe the relationship among Glycated hemoglobin (HbA1c), Fasting blood sugar and Lipid profile in Type 2 diabetics of Surat, Gujarat.

MATERIAL AND METHOD

Study comprised a total of 146 patients who were examined in study of HbA1c in type 2 diabetic patients. There were 86 males and 60 females. Informed consent was taken from the subjects. Ethical clearance was taken from ethical committee of Surat Municipal Institute Of Medical Education And Research Hospital during the period of 18 months between January 2019 to July 2020 were taken up for the study.The age of patients ranges between 30 to more than 70 years, whome fasting glucose concentration ≥126mg/dl includes both men and women.

All the patients were categorized into five age groups: 31-40,41-50,51-60,61-70,>70 years. Venous blood samples from all the subjects were collected in serum separator tubes. The sera were analyzed for glycated hemoglobin (HbA1c), fasting blood glucose (FBS), total cholesterol (TC), triglycerides (TS) and high-density lipoprotein cholesterol (HDL) using an auto analyzer Hitachy 17 The level of low density lipoprotein cholesterol (LDL) was determined using the formula: LDL = (Cholesterol – TG) / (2,2 HDL). The impact of glycemic control on various parameters was evaluated by categorizing all the patients into 2 categories on the basis of HbA1c levels: HbA1c < 7% (good glycemic control, HbA1c > 7% (poor glycemic control)[5].

Hypercholesterolemia is defined as TC > 200 mg/dl, high LDL when value > 100 mg / dl, hypertriglyceridemia as TG > 150 mg/dl and low HDL when value < 40 mg/dl. Dyslipidemia was defined by presence of one or more than one abnormal serum lipid concentration6.