

A Clinico-Epidemiological Study of Peristomal Skin Complication in Pediatric Population

Saurabh Sarda¹, Prasanjeet Dash², Pooja Patidar³, Ransingh Tanwar⁴

¹Senior Resident, Department of Dermatology, Venereology and Leprosy, Dr. Ulhas Patil Medical College, Jalgaon, Maharashtra, India

²Assistant Professor, Department of Dermatology, Venereology and Leprosy, Pandit Raghunath Murmu Medical College, Baripada, Odisha, India

³Senior Resident, Department of Dermatology, Venereology and Leprosy, Index Medical College and Hospital, Indore, Madhya Pradesh, India

⁴Senior Resident, Department of Dermatology, Venereology and Leprosy, Gandhi Medical College, Bhopal, Madhya Pradesh, India

Received: 25-12-2023 / Revised: 23-01-2024 / Accepted: 26-02-2024

Corresponding Author: Dr. Ransingh Tanwar

Conflict of interest: Nil

Abstract:

Introduction: Paediatric patients undergoing ostomies have a high prevalence of cutaneous complications but are frequently overlooked. Available literature regarding peristomal cutaneous complications in the paediatric age group is scanty. In addition, as far as we know, there is no Indian literature available on this important issue, and no comprehensive study has been conducted to categorise and compare the occurrence of different dermatological problems in these paediatric patients. Therefore, we have designed this study to obtain a comprehensive understanding of this prevalent yet understudied issue, which will aid in its efficient prevention, management, and management in the future.

Objectives: To epidemiologically study different peristomal skin complications in the Paediatric population undergoing stoma procedure.

Material and Methods: This study was conducted after approval from the Institutional review board and ethical committee. All paediatric patients undergoing stoma surgery in the Department of Paediatric Surgery of Maharaja Yeshwantrao Hospital, Indore were included in the study. Recruited patients were subject to detailed history taking that included socio-demographic details, age, birth weight, and maternal age during delivery, maturity (preterm/term/postterm), educational status, occupational status, income, number of siblings, type of house, an indication of surgery.

Results: 97 neonates were recruited for the study with a male: female ratio of 2.6:1. The mean age of patients in the study was 2.05 days. Skin complications were present in 48.5% of patients. 55.7% of patients living in the rural locality had skin complications while only 29.6% of urban locality patients had them. Similarly, those subjects dwelling in 'kaccha' house (58.46%) had more skin complications than those dwelling in pakka house (28.12%). Main indication for a stoma formation was Anorectal malformation (93.8%).

Conclusion: A higher proportion of skin complications were seen in patients with Ileostomy in which 4 out of 4 patients had skin complications when compared to patients with colostomy in which 43 out of 93 had skin complications.

Keywords: Clinico-epidemiological, Peristomal Skin Complication, Stoma Procedure, Pediatric Population.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

A stoma is an artificial opening of the gastrointestinal tract to the skin surface.[1] A stoma is formed by surgically removing and exposing a section of the gastrointestinal system onto the skin surface. This is done to redirect the passage of faeces (in the case of colostomy/ileostomy) or urine (in the case of urostomy or ileal conduit) to the skin surface. [2]. Due to the increase in the number of newborns, including premature babies, with

congenital and acquired diseases of the gastrointestinal tract (GIT), surgical interventions accompanied by the imposition of an intestinal stoma remain highly relevant. Unlike adult patients, most children are carriers of intestinal stomas for only 2-6 months, after which reconstructive operations eliminate them. About 21,000 people have an abdominal stoma formed each year in the UK, with a large proportion intended as temporary

or palliative procedures rather than a long-term therapeutic solution. There are no exact figures available and although estimates vary, at any one time there are probably over 100,000 people in the UK with a chronic abdominal stoma [3]. Ostomies are quite common in paediatric surgical practice and they are usually created to divert feces and flatus from distal pathologies in the paediatric age group with high anorectal malformations, Hirschsprung's disease, colonic atresia, peritonitis, necrotizing enterocolitis (NEC), complex pelvic malformations and colonic traumas in children [1,4]. Stomas are associated with numerous complications of which surgical and dermatological complications constitute a major part. So, an optimally positioned, technically correct and easy-to-care stoma is crucial for the patient's quality of life.

Literature suggests that these complication rates in paediatric series exceed 50%. The complications encompass Prolapse, Stricture, Retraction, Wound separation, and dehiscence, Wound infection, postoperative sepsis, parastomal hernia, Intestinal wall detachment or perforation which may occur during catheter change, Displacement of incorrect section or end of the intestine Intestinal blockage can occur due to adhesion or internal hernia. Intestinal torsion accompanied with restricted blood supply, Formation of a fistula, Perforation caused by the insertion of a catheter for feeding or irrigation purposes, Inadequate appliance installation and water seepage, Psychological trauma Variceal haemorrhage resulting from portal hypertension Disturbance in the equilibrium of electrolytes, Acidosis resulting from the absorption of urine in the distal loop of the intestine. Faecal impaction occurs in the distal loop of the intestine. Dermatological symptoms include chemical damage, such as irritating contact dermatitis caused by the impacts of effluent.

The causes of skin damage may be categorised into four main groups: mechanical trauma resulting from stripping, tearing, or pressure; infectious disorders caused by bacterial, fungal, or viral infections; immunological reactions such as allergic contact dermatitis; and disease-related illnesses like pyoderma gangrenosum (PG) or psoriasis. [5,6] Of all these skin-related problems, the most common is irritant dermatitis [2,7] which is a result of the chemical injury from stool or urine.

The main reasons for leakage are improper stoma site location, inadequately fitted pouching systems, and consistency of effluent. Stripping along with tear and pressure is seen to be associated with Mechanical destruction. Removing a pouching system inevitably results in some degree of mechanical harm to the outer layer of the skin. The

repercussions are minimal if the poaching system is eliminated only twice a week. However, if the pouching system is removed often during the day, the outer layer of skin, known as the epidermis, might become stripped away, resulting in mechanical harm. Mechanical trauma can exacerbate irritant dermatitis when leakage or burning occurs, leading to more frequent pouch changes, which in turn can cause further skin damage. Peristomal skin infection can be caused by bacteria, fungi, or viruses. Several studies suggest that infection is responsible for 7% of peristomal skin issues. [2] This can be attributed to a variety of circumstances such as a breach in the integrity of the skin, significant colonisation by enteric flora on the peristomal skin, or the patient's impaired immune system. An accurate diagnosis is essential for all infections. Infections that have been misdiagnosed and are being treated with topical corticosteroids have the potential to rapidly spread. Allergic contact dermatitis can occur as a result of using pouches, skin barriers, clamps, belts, and adhesives. Allergic contact dermatitis is a rather uncommon condition, even though the appliance is worn in close proximity to the skin for extended periods of time.

The repeated stripping of the skin and the presence of moisture may potentially release allergens. In addition, the dampness might disturb the skin barrier, allowing for more penetration and facilitating sensitization. The occurrence of peristomal dermatological problems is an on-going process, with a frequency ranging from 30% to 67%. [7] This is a niche field that is not frequently seen by dermatologists. Research indicates that the majority of adult patients with a stoma will encounter peristomal complications during the initial two years following surgery.

Moreover, those with decreased mobility or a loss in surgical performance face a progressively higher risk, with a likelihood of 75%. Even though not fatal, peristomal skin complications can be severe enough to significantly impair a patient's quality of life. Hence, the role of stoma care by an enterostomal therapist and a dermatologist can be instrumental in avoiding problems associated with colostomy.

Aim and Objectives: To epidemiologically study different peristomal skin complications in the Paediatric population undergoing stoma procedure.

Material and Methods

The present hospital-based Prospective Cohort study was conducted in the Department of Dermatology, Venereology and Leprosy in collaboration with the Department Paediatric Surgery of Maharaja Yeshwantrao Hospital, Indore during the period from February 2020 to February 2021.

Inclusion Criteria: All paediatric patients undergoing stoma surgery in the Department of Paediatric Surgery of Maharaja Yeshwantrao Hospital, Indore, (Madhya Pradesh) were included in the study.

Study Population: All paediatric patients undergoing stoma surgery in the Department of Paediatric Surgery of Maharaja Yeshwantrao Hospital, Indore.

Exclusion Criteria: Parents of neonates not giving consent for enrolment were excluded from our study.

Methodology: This study was conducted after approval from the Institutional review board and ethical committee, Maharaja Yeshwantrao Hospital, Indore (Madhya Pradesh). Given that all patients were under the age of 18, we received informed consent in writing from each patient's parents or guardians after thoroughly describing the research process in their native language. Of a total of 102 patients who underwent stoma creation procedure in the Department of Paediatric Surgery of Maharaja Yeshwantrao Hospital, Indore, 97 were recruited in our observational study as 5 were excluded because their parents did not give consent for participation. Patient's personal details (address & contact number) were recorded for contacting them in case they fail to follow up. Contact numbers, as well as what's app number of the principal investigator, were provided to every parent. Recruited patients were subject to detailed history taking that included socio-demographic details, age, birth weight, and maternal age during delivery, maturity (preterm/term/postterm), educational status,

occupational status, income, number of siblings, type of house, an indication of surgery. The socio-economic class was assessed using Kuppaswamy socioeconomic Status Scale (2012) which comprises of educational status, occupational status and monthly income. Stoma type, stoma configuration, and suture material used were obtained from the postoperative notes of the patient. According to the protocol followed by the department of pediatric surgery of this institution, no stoma appliance was used for most of the neonates and infants because of the unavailability of such small size stoma appliances. Even if available, due to cost issues, the patients coming to this government setup could not afford them as they are very expensive. So, information regarding stoma appliances could not be taken in our study. Recruited subjects underwent a detailed history taking including general physical and dermatological examination. The visits are spaced in the time interval to match the visits kept by the Department of Paediatric Surgery for the Patient's convenience and to avoid loss of follow-up. Regular follow-up following stoma creation after 15 days and once monthly thereafter until 6 months or stoma closure, whichever was earlier was done. So, a total of 6 visits were done at 15 days, 1.5 months, 2.5 months, 3.5 months, 4.5 months, and 5.5 months. The patient's dermatological examination was done in OPD Of Skin and V.D. which was in the same building as that of OPD of pediatric surgery.

Patients were then be categorized into following different groups by taking help of the following diagnostic guide [8]:

Etiology	Clinical features	Diagnoses
Impaired skin integrity from leakage	Erythema, maceration, erosion, and hypergranulation	Irritant Contact Dermatitis
Moisture around or under the appliance, systemic antibiotic therapy which alters the flora, immunosuppressive medications	Erythema Extrafollicular lesions or pustules. Satellite lesions. Itch or burn.	Candidial infection
The infected hair follicle, traumatic hair Removal/shaving	Erythema, pustules, or Pinpoint pustules arising from hair follicles	Bacterial infection
Improper use of equipment, fragile skin	Denuded skin, ulceration of the Skin. A lesion with irregular borders	Mechanical Irritation
Unknown	Rapidly growing painful peristomal ulcer with a violaceous border	Peristomal Pyoderma Gangrenosum
Pre-existing skin diseases. Often the peristomal area is predisposed to	Features as if located elsewhere	Other skin diseases also located on peristomal area: e.g. Psoriasis, Atopic dermatitis, seborrheic dermatitis

After making a Diagnosis, Appropriate Preventive measures and treatment were given to respective patients.

The compilation of the data was performed using the Microsoft Excel programme. The patient's identifying data were strictly protected. The data

analysis was performed using version 28.0 of the Statistical Package for Social Sciences (SPSS).

The statistical significance of the connection between the dependent (outcome) and independent (predictor) variables was assessed using the Chi-square (χ^2) test. A p-value of less than 0.05 was used to determine statistical significance. Wherever applicable, the risk ratio was computed.

Observations and Results

During the period of study, a total of 102 patients with conditions who had undergone stoma formation in the department of Paediatric Surgery, M.Y. Hospital were selected for participation. However, five parents of patients did not give consent for the study and were therefore excluded from the study. Thus, 97 patients were available for the final analysis.

Table 1: Baseline characteristics of the study population

S. No.	Characteristics	Frequency (N)
1	Total patients	97
2	Male	70
	Female	27
3	Mean age	2.05 days
4	Age range	1 to 5 days
5	Mean birth weight	2.81 kg
6	Mean maternal age at delivery	24.38 years

In our study, 91 patients were operated for Anorectal Malformation, which was followed by 3 patients for Perforation Peritonitis, 2 for Hirschsprung's disease, and 1 for gangrenous caecum. Colostomy was the most commonly performed in 93 neonates, out of which 80 were Transverse and 13 were Sigmoid. Ileostomy was

done in 4 patients. 93 were loop, 3 were end and 1 was double-barrel stoma configuration. All stomas were constructed for temporary purposes. Peristomal Skin Complications: Out of a total of 97 patients, 47 (48.45%) developed peristomal skin complications at some point in time whereas 50 (51.55%) did not develop any skin complications.

Table 2: Comparison between stoma patients with and without dermatological complications based on gender

Gender	Dermatological Complication		Total	P-Value
	Present	Absent		
Male	32	38	70	0.385
Female	15	12	27	
Total	47	50	97	

Table 3: Table showing the age of mothers of neonates with stoma and skin complication

Maternal age at pregnancy in years	Dermatological complication		Total
	Present	Absent	
Less than 20	1	2	3
20-24	37	18	55
25-29	8	25	33
More than 30	1	5	6
Total	47	50	97

In our study, we found that skin complications were relatively more common in neonates of mothers whose age was between 20 to 24 years.

Table 4: Table showing birth weight and peristomal dermatological skin complication

Birth weight	Skin complication		Total	P-value
	Present	Absent		
Normal birth weight	44	44	88	0.341
Low birth weight	3	6	9	
Total	47	50	97	

The Chi-Square statistics is 0.908. The p-value is 0.341. The result is not significant at $p < 0.05$

Table 5: Table showing Prevalence of skin complications among different socioeconomic classes

Socioeconomic Class	Skin complication		Total
	Present	Absent	
Upper middle	2	7	9
Lower Middle	35	40	75
Upper Lower	10	3	13
Total	47	50	97

The maximum number of subjects presenting with skin complications belonged to Lower Middle Class (74.5%) followed by the upper-lower (21.3%) according to the kuppuswamy Socioeconomic status scale (2012). No patients belong to the Lower and upper classes.

Table 6: Number of siblings versus peristomal skin complications

Number of siblings	Skin complication		Total
	Present	Absent	
0	16	22	38
1	25	24	49
2	5	4	9
4	1	0	1
Total	47	50	97

As the number of siblings of the patient increases, there is an increased prevalence of skin complications to the patient.

Table 7: Types of peristomal skin complications and their Frequencies

Skin Complication	Frequency
ICD	39 (82.97%)
Candidial	6(12.7%)
Bacterial	2 (4.25%)

Table 8: Skin complications and frequency in each visit

Skin complication	First visit	Second Visit	Third Visit	Fourth Visit	Fifth Visit	Sixth Visit
ICD	12	32	21	11	5	1
Candida	1	1	3	2	0	0
Bacterial	0	2	0	0	0	0
No skin Complication	84	62	73	84	92	96

Discussion

In our study, we examined 97 neonates (mean age 2 days) who underwent a stoma creation procedure. We have tried to define basic epidemiological characteristics and classified various skin afflictions among them. To the best of our knowledge, no previous study has been performed for peristomal skin complications in paediatric patients; however, few studies are available of peristomal skin complications in the adult population. One of study, published in a nursing journal has taken paediatric stoma patients with skin complications, however, this study has analyzed only DET scores [Discoloration (D), Erosion (E), and Tissue overgrowth (T)] and no emphasis was given to classify according to etiology or treatment.⁹ There was male predominance seen in this study which was in keeping with previous observations reported in studies performed elsewhere.^[10] This may be due to the higher prevalence of Anorectal Malformations in male neonates. In our study, Anorectal malformation (91, 93.8%) was the most

prevalent indication for stoma surgery in the neonatal period which is nearly similar to other studies reported by Massenga et al [10] where they saw ARM in 89.4% of their study participants. Most of the cases of Anorectal Malformations are referred from peripheral hospitals in the state to our tertiary care center, which may explain the high prevalence of it in our study population. The prevalence of peristomal dermatological complications was found to be 48.5% in this study and other studies report it to be 30–67% [5], though they can vary from 6% - 96% (Hanan A. et al) [9]. In our study subjects living in 'kaccha' houses and rural localities showed more prevalence of skin complications which may be possible due to lower literacy, relatively poor living conditions, or lower socioeconomic status.

In our study, a higher proportion of Skin Complications were found in patients who underwent ileostomy (4 out of 4) as compared to Colostomy (43 out of 93). This finding is in agreement with a study done by Persson E et al [11] where 79% of the patients with a loop

ileostomy suffered from a peristomal skin complication. Colostomies have a tendency to yield formed stool intermittently as most of the gut remains intact and functional. We found Peristomal Irritant Contact Dermatitis (ICD) to be the most common and recalcitrant to treat skin manifestation in our study which is a result of the chemical injury from the stool. We have found ICD in 82.97% of all skin complications which is in congruence with Herlufson et al [12] who found ICD to be 77%. While Lyon et al [13] got only 42% of peristomal ICD among all skin complications in their study. This difference may be due to differences in environmental factors and differences in age of study subjects as they performed their study on the adult population while our study was conducted in the paediatric age group. Moreover, the skin of neonates is rather more sensitive and fragile as compared to that of adults. A maximum number of cases presented with Peristomal Irritant contact dermatitis at 15,45 days and 75 days post stoma formation. So, it is relatively an early complication. The second most common skin complication reported in our study were infection in which candida comprised 12.4 % and bacterial infection 4.25 % of all skin complication. Lyon et al [13] reported skin infection in 7% of peristomal skin complications.

The skin infection around the stoma is mainly due to a humid environment caused by continuous leakage of fluid and maceration which favors candidial infection. There is an increased prevalence of Peristomal Infections in our study that may be explained based on age differences in study subjects and geographical variations as our study is conducted in a tropical environment. The increased incidence of skin infections may also be attributed to poor personal hygiene, poor sterilization procedures, and lower socioeconomic status in the study group. Allergic Contact Dermatitis (ACD) case was not seen in our study as no stoma appliance was used in our study population and even other studies by Lyon et al [13] suggest that ACD is very rare (0.6%).

This can be partially explained by the number of individual case reports published in the last 30 years detailing sensitivities to distinct components several of which, such as epoxy resin systems, are not used now in appliance manufacture³. These reports have been also articulately summarized by Martin et al [14].

In addition, we did not encounter any instances of Peristomal Pyoderma Gangrenosum (PPG), a highly uncommon condition with an estimated incidence rate of only 0.7% [2]. PPG does not display a response to traditional wound treatment methods and shows pathergy. However, in our investigation, all patients demonstrated a positive response to conventional therapy.

Conclusion

In this study, the most common dermatological complication was Peristomal Irritant Contact dermatitis followed by Peristomal Cutaneous Candidiasis. Pyodermas were the third commonest cutaneous complication found in our study. The incidences of peristomal irritant contact dermatitis were commonest during the initial two and half months, suggesting it to be an early complication. Similarly, cutaneous candidiasis was mostly observed during the third to fourth months. Bacterial infection was seen during the second to the third month follow- up; however, in our study population, bacterial infections were rare. Overall, it can be stated that all the stoma cases have some sort of cutaneous complications but they resolve completely in about every case.

Further, following the closure of the stoma, the skin around the closure point returns to normal invariably, none of our subjects developed any chronic sequelae of osteoma closure. Simple bedside investigations like Gram's staining, KOH mount and culture are sufficient for diagnosing the cutaneous complications in post-stoma surgery cases. Also, most of the peristomal skin complications were mild and responded well to routine treatment. Peristomal Irritant contact dermatitis responded over a prolonged period whereas infections responded quickly. Treatment of these dermatological complications was also well-tolerated in our study.

References

1. MD AGC, MD NSA, MD TMK, Laberge JM, Shamberger R, MD AC. Pediatric Surgery, 2-Volume Set: Expert Consult - Online and Print. Elsevier Health Sciences; 2012.
2. Lyon CC, Smith AJ, Griffiths CE, Beck MH. The spectrum of skin disorders in abdominal stoma patients. *Br J Dermatol* 2000.
3. Tahir 99. Rook's Textbook of Dermatology, 4 Volume Set 9th Edition 2016; (PDF) by Christopher Griffiths - UnitedVRG. Accessed November 7, 2021 <https://unitedvrg.com/2020/09/01/rooks-textbook-of-dermatology-4-volume-set-9th-edition-2016-pdf/>
4. Chan KWE, Lee KH, Tsui SYB, et al. Bowel perforation in newborn with anorectal malformation and no fistula at presentation. *J Pediatr Surg*. 2014; 49(3):390-394.
5. Moriyasu A, Katoh N, Kishimoto S. Psoriasis localized exclusively to peristomal skin. *J Am Acad Dermatol*. 2006;54(2 Suppl):S55-56.
6. Nybaek H, Olsen AG, Karlsmark T, Jemec GBE. Topical therapy for peristomal pyoderma gangrenosum. *J Cutan Med Surg*. 2004; 8(4):220-223.

7. Nyback H, Jemec GBE. Skin problems in stoma patients. *J Eur Acad Dermatol Venereol JEADV*. 2010; 24(3):249-257.
8. Bergman B, Knutson F, Lincoln K, Löwhagen GB, Mobacken H, Wåhlén P. Chronic papillomatous dermatitis as a peristomal complication in conduit urinary diversion. *Scand J Urol Nephrol*. 1979; 13(2):201-204.
9. Abd- Elhay HA, Osman MA, Gadallah MA, Sayed EH. Post-operative Peristomal Skin Complications in Children with Colostomy. *Assiut Sci Nurs J*. 2019; 7(19):147-153.
10. Massenga A, Chibwae A, Nuri AA, et al. Indications for and complications of intestinal stomas in the children and adults at a tertiary care hospital in a resource-limited setting: a Tanzanian experience. *BMC Gastroenterol*. 2019; 19(1):157.
11. Persson E, Berndtsson I, Carlsson E, Hallén AM, Lindholm E. Stoma-related complications and stoma size - a 2-year follow up. *Colorectal Dis Off J Assoc Coloproctology G B Irel*. 2010; 12(10):971-976.
12. Herlufsen P, Olsen AG, Carlsen B, et al. Study of peristomal skin disorders in patients with permanent stomas. *Br J Nurs Mark Allen Publ*. 2006; 15(16):854-862.
13. Lyon CC, Smith AJ, Griffiths CE, Beck MH. The spectrum of skin disorders in abdominal stoma patients. *Br J Dermatol*. 2000; 143(6):1248-1260.
14. 14. Martin JA, Hughes TM, Stone NM. Peristomal allergic contact dermatitis--case report and review of the literature. *Contact Dermatitis*. 2005; 52(5):273-275.