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2. Abstract
3. Text
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Book with one author or editor:

- Mason J. Concepts in dental public health. Philadelphia: Lippincott Williams & Wilkins; 2005.

Books with more than six authors/editors:

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E-book:

- Irfan A. Protocols for predictable aesthetic dental restorations [Internet]. Oxford: Blackwell Munksgaard; 2006 [cited 2009 May 21]. Available from Netlibrary:http://cclsw2.vcc.ca:2048/login?url=http://www.netLibrary.com/urlapi.asp?

Journal article: print

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Journal article: online/electronic

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ORIGINAL ARTICLE

Use of Betamethasone Ointment (0.05%) and Petroleum Jelly for Prepubertal Labial Adhesion: A Short Time Follow-up Study in A District Hospital

Md. Mozammel Haque,[1] Aminul Islam Sheikh,[2] A.K.M. Fazlul Haque,[3] Lutful Kabir,[4] Rokshana Yasmin,[5] Shahana Begum[6]

ABSTRACT

Background: Labial adhesion is the spontaneous fusion of labia minora which is commonly seen in prepubertal girls producing much anxiety to the parents. **Objectives:** To evaluate the efficacy of betamethasone 0.05% ointment for resolution of labial adhesion and petroleum jelly to prevent recurrence of labial adhesion. **Methods:** Total 85 patients were included and followed up at Bangamata Sheikh Fazilatunnesa Mujib General Hospital Sirajganj for the problem of labial adhesion. Children with labial adhesion were treated with betamethasone 0.05% ointment for single course of maximum 45 days. All of them were advised to use petroleum jelly after complete resolution of labial adhesion. The effect of the treatment was prospectively followed and assessed by clinical examination. **Results:** 78 cases reported complete resolution within maximum 45 days. Average duration of treatment was 26 days (7-45 days). The mean age of the labial adhesion patients were 24.12 months (3-84 months). The efficacy of single course betamethasone 0.05% ointment showed successful in 91.8% cases. All cases were advised application of petroleum jelly for 2 months after complete resolution of labial adhesion to prevent recurrence. 9 cases (11.5%) reported recurrence of labial adhesion during subsequent follow up visits. **Conclusion:** Topical application of betamethasone 0.05% ointment is a good alternative to manage labial adhesion in regarding safety, efficacy and cost. Use of petroleum jelly to prevent recurrence is helpful but not 100% effective to prevent recurrence.

Keywords: Labial adhesion, Betamethasone ointment, Petroleum jelly

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INTRODUCTION

Labial adhesion is the fusion of labia minora partly or completely. The exact cause is unknown but thought that the local irritation and inflammation of the microtraumatiseddenuded non-estrogenized labial skin leads to midline adherence of closely apposed labia minora.[1-4] The condition is mostly seen at the age of 3 months to 6 years and rare after puberty.[3,6] The detection rate varies from 1.8% to 38.9%.[4,7,11] The condition is usually asymptomatic but may produce abnormal voiding, post void dribbling of urine, discomfort with voiding, vaginal pain or discharge and urinary tract infection.[1]

Treatment for this condition is usually carried out with reassurance and topical application of estrogen or steroid or manual separation.[8,13,15] Topical application of betamethasone 0.05% was successfully used to manage phimosis

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among male children.[9] Now it has included in the management of labial adhesion and found superior to estrogen cream in comparative study.[2,9]

The recurrence rate varies from 0 to 76%.[1] Which is more common in girls who wear diapers.[15] So the improvement of hygiene is necessary. Despite firm reassurance there is excessive parental anxiety.[13] This is safe, effective, easily available and low cost alternative.[9,15] Commonly topical application of estrogen cream is used as the first line treatment option.[5] So, we decided medical intervention for labial adhesion patients with betamethasone 0.05% ointment to overcome the problem.

MATERIALS & METHODS

Total 109 cases were attended at Bangamata Sheikh Fazilatunnesa Mujib General Hospital, Sirajganj for the problem with labial adhesion and followed up during the period of January 2021 to June 2022. Childrens with labial adhesion were examined and followed prospectively at department of gynecology and obstetrics, pediatrics and pediatric surgery outpatient department (OPD). Inclusion criteria to include this study were children with labial adhesion aged up to 7 years, who were previously not treated with any other medications. All cases were treated withbetamethasone 0.05% (Betameson) ointment twice daily. Parents were asked to attend at the hospital 15 days interval and any changes were recorded. Treatment continued up to full separation of the labia minora but not exceeding 45 days. After 3rd follow up (45 days) if the problem was not resolved then it was recorded as failure. After complete separation it was advised to apply petroleum jelly (Meril) for 2 months. Data collected includes, patients age, contact informations, duration and effect of the treatment.

RESULTS

Out of 109 cases 13 cases were recurrent labial adhesion, 2 cases were older than 7 years. Nine cases were not reported on follow up visit; so, they were excluded from the study. Remaining 85 patients were analyzed. Among 85 cases most of them (45.9%) were from age group 3-12 months of age. No parents complained about labial adhesion before 3 months of age. Most cases were within the range of 3 to 36 months (83.52%), there after it was found gradually decreased and only 4 cases reported within the range of 61 months to 84 months. Two cases reported labial adhesion over 84 months of age (Table I). Out of total 85 cases 78 cases were reported complete resolution within 45-day application of betamethasone for labial adhesion. The Success rate was 91.8% (Table II). All Patients were offered betamethasone 0.05% for the treatment of labial adhesion. After 15 days 7 cases (8.2%) reports complete resolution and 8 cases partial resolution. After 30 days 18 cases (21.2%) reports complete resolution and 42 cases partial resolution. After 45 day treatment 53 cases (62.4%) reports complete resolution of labial adhesion but 7 cases observed no change. Total 78 cases (91.8%) showed resolution within 45 days. Remaining 7 patient did not respond to maximum 45-day betamethasone application and were referred to pediatric surgery OPD for further management (Figure I). After complete resolution of labial adhesion all cases were offered application of petroleum jelly for 2 months to prevent recurrence. After 2-month application of petroleum jelly 9 cases report recurrence of labial adhesion during subsequent follow up visits (Table III).

The 7 nonresponsive cases were manually separated. After manual separation parents of all cases were advised 2-month application of petroleum jelly twice daily. On subsequent follow up visit none of them report recurrence (Table IV).

All cases were followed up after application of betamethasone 0.05% ointment for labial adhesion 15 days interval up to complete resolution of the problem. Then all resolved cases were followed up after 2 months application of petroleum jelly and asked to report any recurrence. So we have had the opportunity to follow up maximum one and half year for the first case and only 4 months for the last case. Average follow up period was 11 months.

Table I: Age distribution of the cases (n=85)

Age range (Months)	Number of cases (N)	Percentage (%)
3-12	39	45.9
13-24	23	27.1
25-36	9	10.6
37-48	7	8.2
49-60	3	3.5
61-72	2	2.4
73-84	2	2.4
Total	85	100.0

Table II: Efficacy of betamethasone 0.05% ointment in labial adhesion (n=85)

Total cases (n=85)		Efficacy
Total resolved	Not resolved	
78	7	91.18%

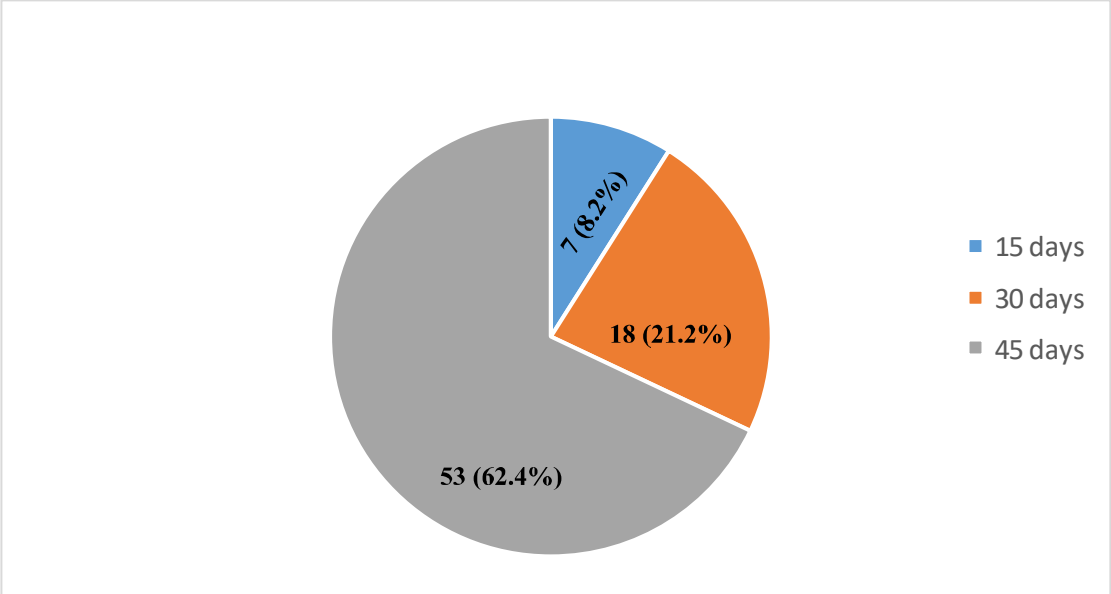

Figure I: Duration of treatment required for resolution of labial adhesion (n=78)

Table III: Recurrence after 2-month application of petroleum jelly (n=78)

Total resolved	No recurrence	Recurrence	Rate of recurrence
78	69	9	11.5%

Table IV: Treatment and recurrence ratefor the cases not responded to betamethasone 0.05% ointment (n=7)

Number of non-responded cases	Treatment	Recurrence after 2 months application of petroleum jelly
7	Manual separation followed by application of petroleum jelly for 2 months	None

DISCUSSION

Labial adhesion also known as labial synechia, labial agglutination, labial fusion, vulval synechia.[4,12,14] Labial adhesion is a common urogenital problem in children. We found total 109 cases in a district hospital within one and half years of period. The actual cases may be more because we examined only those children who were brought to the hospital by parents. If all children were examined by primary health care workers or by parents, then it would be very high. In Ok Lee et al., reported average 55 cases per 100,000 persons per year in South Korea.[12] Most of the mother noticed the problem during cleaning the genital area and suddenly discovered that the vagina is not present but it was previously Present. Many of them said that actually we do not know whether the vaginal orifice was there or not. Usually most of the patients are asymptomatic.[11] But some parents described abnormal voiding regarding urine flow and few cases found with the features of urinary tract infection like frequent micturition. Urinary tract infection was reported very high in labial adhesion patients and routine genital examination was advocated.[10] Though the problem is not so severe but the parental anxiety was observed very high. Most of the labial adhesions usually resolved spontaneously by time.[4,9]

This is the problem of early childhood and most commonly happened during 3 months to 6 years.[6] We found no cases before 3 months but we found 2 cases older than 7 years. Labial adhesions occur during prepubertal girls, as the age is closer to the puberty it decreases due to the elevation of estrogen hormone. Labial adhesion may occur during adolescent period and also in adult but it very rare.[4] We found most cases within the age range 3-36 months (83.5%). Which is little higher to the previous studies described by Rubinstein et al., (73.9%).[6]

There are several options to manage the labial adhesion. Spontaneous resolution occurs in most cases but it takes long time. Jean E Norris et al., reported 40% spontaneous resolution after 2.6 year of median follow up period.[4] NASPAG (North American Society for Pediatric and Adolescent Gynecology) recommends conservative management for the asymptomatic patients is most appropriate approach. They also advocate emphasis on optimizing vulvar hygiene. For the symptomatic patients short-term topical estrogen is the best initial therapeutic recommendation. Betamethasone 0.05% is an alternative or adjunctive medical therapy.[15] For acute onset of adhesion with severe symptoms manual separation using topical anesthesia may be considered. Most authors recommend treatment as a result of symptoms but other authors recommend treatment to avoid symptoms.[5] To prevent recurrence bland emollients should be applied for extended period of time.[15]

We found excellent success rate (91.8%) with betamethasone 0.05% ointmentapplication twice daily for maximum 45 days to the prepubertal girls who had labial adhesion. Similar success rate was observed by Gazendra Nath Mahato et al.,[2] (92%), Nazile Erturk,[9] (89.4%). After 15 days observation 7 cases showed complete resolution and 8 cases with partial resolution, after 30 days it was 18 complete resolution and 42 partial resolution and after 45 days 53 cases had complete resolution but 7 remains unchanged. The duration of treatment varies may be due to the type of adhesions. Thin varieties resolves earlier than the thick variety.[1] But for the single course of treatment it should not be extended 45 days because extension of the treatment beyond 6 weeks has no contribution to the outcome.[1]

Seven cases required manual separation. Manual separation remains as the important part of treatment but it should be reserved for those symptomatic patients and when the medical therapy has failed or those adhesions appear Type III or IV subtype of thick variety.[1,15] We found no cases of vaginal atresia or Mullerian duct anomalies where upper 2/3rd of vagina and the uterus is absent which may be presented as labial adhesion, but can be excluded with careful examination. Divya Dwivedi et al., also found no cases of Mullerian duct anomalies in 102 cases of labial adhesion.[14]

To prevent recurrence after complete separation parents were requested to apply petroleum jelly to the area of resolved adhesion twice daily for 2 months and was asked to report any change during or after the follow up period. Out of 78 completely resolved labial adhesion 9 develops recurrent labial adhesion despite use of petroleum jelly to prevent recurrence. All the parents again reassured about the problem and advised reapplication of betamethasone 0.05% ointment

for the period necessary to resolution of problem completely but not extending 45 days and again advised application of petroleum jelly for extended period of 4 months. All of them resolved and none of them complaints re-recurrence thereafter. Petroleum jelly is a bland emollient which acts as the barrier to prevent readhesion.[15]

The treatment cost is very important especially for our low income group population. Cost of betamethasone 0.05% ointment is very low (48.00 BDT) in comparison to estrogen cream (1,000.00 BDT). Which will be beneficial to our low earning peoples. The study was conducted in a constrained time frame, with a limited number of patients and involved only one tertiary care hospital in Bangladesh, so the findings may not represent overall existing practice in the country.

CONCLUSION

Labial adhesions are very common problem attending at outpatients department of gynecology and obstetrics department and other department especially pediatrics and pediatric surgery OPD. Parental concern is the main reason for the intervention, otherwise it resolves spontaneously before puberty. Short timebetamethasone 0.05% ointment may be used to treat labial adhesion as a safe, effective and low cost medicine than estrogen cream.

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ORIGINAL ARTICLE

Distribution and Pattern of Injuries from the Fall from Height in Fatal Cases

Sandwip Talukdar,[1] Debashish Kumer Ghosh,[2] Md. Shamim Ahmed,[3] Kafil Uddin,[4] Shafiqul Islam,[5] Preyanka Chowdhury[6]

ABSTRACT

Background: A fall is an event in which a person in advertently lands on the ground from a higher place, such as a building, roof, ladder, or any other elevated area in a workplace. In 2012, WHO categorized falls as the second highly common cause of unintentional mortality caused by injury after traffic accidents. The injuries fatalities depend on the height of fall and its impact surface. Landing position is also considered as an important parameter. **Objectives:** To study the pattern and distribution of injuries caused by fall from height in fatal cases. **Methods:** A cross sectional hospital based study was conducted in the Department of Forensic Medicine and Toxicology of North Bengal Medical College, Sirajganj, Bangladesh during the period of January, 2018 to December, 2021. A total of fifty cases were included in this study from 250 beded Bongamata Sheikh fazilatunnesa Mujib General Hospital, Sirajganj. All the victims brought from the accident site or after death as a consequence of fall during the study period. Data regarding name, age, sex, occupation, nature of fall, site of primary impact, nature of floor on which they fall, height from which they fall, period of survival, type and dimension of injuries were documented from hospital records. Blood and urine examinations were also done for finding alcohol and drugs. **Results:** Among the study victims, majority were male and belonged 31-40 years of age group. Common site of primary impact was head (50%). Fracture and abrasion were common pattern of injuries whereas head injury was fatal. **Conclusion:** Fall from heights cause significant morbidity and mortality. It is important to create awareness among the workers and to provide safety gears for the persons working in construction sites.

Keywords: Distribution of injuries, Fall from height, Impact

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INTRODUCTION

A fall is an event in which a person inadvertently lands on the ground from a higher place, such as a building, roof, ladder, or any other elevated area in a workplace.[1] In 2012, WHO categorized falls as the second highly common cause of unintentional mortality caused by injury after road traffic accidents. Each year 646000 falls occurs approximately. In Lowand middle income countries, the falls related fatalities occurs in 80% cases. Sixty percentage (60%) death occurs due to fall from the height in the south East Asia and the Western Pacific region. The most common victims belongs to 30-45 years of age.[2,3] In Present situation the falls from the height was found to be increased in urban areas due to the increased construction activities. It occurs generally in the accidents, suicides and to less extent in homicides. The characteristics of injuries depend on several factors; the height of falling,

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the composition of the impact surface, the landing position of the body as well as individual factors such as age, sex, body weight, and comorbidities of the patient.[4,5,6] Several risk factors are involved in morbidity and mortality of fall from height. They could be categorized into intrinsic and extrinsic factors e.g. at the moment of impact, a falling body undergoes deceleration and amount of kinetic energy transferred to the Ground reacts with an equal amount against the body itself etc. Thus in the present situation study of deaths due to fall from height assumes a greater importance and it is absolutely essential to lay more emphasis on it. The pattern of injuries depends upon many factors like the height of fall, velocity, the primary impact site, the contact tissue viscosity and elasticity and ground surface etc.[7,8] Around 37.3 million falls requires medical attention due to the severity of the injury. Sometimes, when a body is subjected to an autopsy, it is unclear whether injuries are caused by a fall from a height or due to blunt trauma from other causes.[8] Henceforth, this study aimed to spotlight injuries caused by fatal falls from a height. So that, any pattern that might help to differentiate between these injuries and injuries caused by blunt trauma from other causes.

MATERIALS & METHODS

This hospital based cross sectional study was conducted in the Department of Forensic Medicine and Toxicology of North Bengal Medical College, Sirajganj, Bangladesh during the period of January, 2018 to December, 2021. A total of fifty cases were included in this study from 250 beded Bongamata Sheikh Fazilatunnesa Mujib General Hospital, Sirajganj. All the victims brought from the accident site or after death as a consequence of fall during the study period. Data regarding name, age, sex, occupation, nature of fall, site of primary impact, nature of floor on which they fall, height from which they fall, period of survival, type and dimension of injuries were documented from hospital records.

The height was measured by visiting the crime scene. Survival period was calculated from the treatment findings and the autopsy findings. Precipitating factors like mental illness, epilepsy, natural diseases and the use of drugs or alcohol were found with special efforts. Data related to the injury types (internal or external), nature of injury, its dimensions and location where also recorded. Primary impact injuries photo was taken and noted. Blood and urine examination were done for analysis of alcohol or drugs if suspicion. Autopsy was conducted by Letulle's method of an en masse removal of viscera and dissection of organs.

Different patterns of injuries of all body regions were reported. Blood and urine samples, liver tissue, kidney tissue, and stomach contents were examined for toxicological screening, and the results were reported. Fatal falls from height with no gross injuries, tissue samples for histopathological examination were taken, and the results were reported.

Dissection of head, scalp, dura, vault and base of skull were examined for the head injuries. To find out the kind of hemorrhage like Subdural Hemorrhage (SDH), Extradural Hemorrhage (EDH), Sub Arachnoid Hemorrhage (SAH), Intra ventricular Hemorrhage (IVH) and the Intra cerebral Hemorrhage (ICH), brain was dissected carefully. The blood infiltration areas were cleaned with the help of water, then it is dissected an examined to assess the nature of injury and its extent. After collecting the data, it was entered in MS excel Windows 10. Categorical variable were expressed in terms of numbers percentages.

RESULTS

A total of fifty cases were included in this study. Among the victims majority were male (40, 80%) followed by female (10, 20%) and most of the victims (10, 26%) belongs to 31-40 years of age group (Table I). In this study, maximum victims (16, 32%) were day laborer followed by construction workers (8, 16%) and unemployed (7, 14%) (Table II). Primary impact injuries were commonly occurred in head (25, 50%), back (6, 12%) and chest (5, 10%) of the victims (Table III). Fractures (48, 98%), abrasions (45, 90%) and intracranial hemorrhages (41, 82%) were the common injuries of the victims (Table IV). In this study it was showed that, Common site of fatal injuries were head (15, 30%) followed by multiple site injuries (14, 28%) (Table V).

Table I: Age and sex of the Victims (n=50)

Age in years	Male	Female	Total (N/%)
<10	0	1	1 (2%)
11-20	7	2	9 (18%)
21-30	8	0	8 (16%)
31-40	10	3	13 (26%)
41-50	6	0	6 (12%)
51-60	5	2	7 (14%)
>60	4	2	6 (12%)
Total	40	10	50 (100%)

Table II: Occupational status of the victims (n=50)

Occupation	Number (N)	Percentage (%)
Day Laborer	16	32%
Construction worker	08	16%
Unemployed	07	14%
Student	06	12%
Painter	03	6%
Driver	02	4%
Farmer	01	2%
IT Worker	01	2%
Own Business	01	2%
Others	05	10%

Table III: Distribution of primary impact of injuries (n=50)

Part of the body injured	Number (N)	Percentage (%)
Head	25	50%
Back	06	12%
Chest	05	10%
Neck	04	8%
Shoulder	03	6%
Foot	03	6%
Face	04	8%

Table IV: Pattern of injuries of the victims (n=50)

Pattern of injury	Number (N)	Percentage (%)
Fractures	48	98%
Abrasions	45	90%
Intracranial Hemorrhage	41	82%
Lacerations	15	30%
Contusions	06	12%

*Multiple responses

Table V: Distribution of the site of fatal injuries (n=50)

Site of injury	Number (N)	Percentage (%)
Head injury	15	30%
Multiple site injuries	14	28%
Spinal injury	10	20%
Cerebrospinal injury	5	10%
Pelvic injury	4	8%
Blunt injury abdomen	2	4%
Total	50	100%

DISCUSSION

Injury due to fall from height remain a significant cause of morbidity and mortality in our day to day life. Fatalities occur primarily when a person fall from roofs, windows, and balconies of greater than two storied building or when the head of the victim hits a hard surface, such as concrete.[9,10]

In this study, 80% victims were male. This result was supported by the studies done by Mukesh et al.,[11] Lalwani,[12] and Kumar,[13] The maximumcases (26%) belonged to 31-40 years of age group. Similar results were observed by Mukesh et al.,[11] Prathapan,[14] and Kohli.[15] This study revealed that, head (50%) was the common site of primary impact of injury. This finding is consistent with the similar studies done by Kumar,[13] (46.6%) and Prathapan,[14] (53%).

Fractures (98%) and abrasions (90%) were the common pattern of injury in this study. Patterns of injury were almost same with the study conducted by Mukesh et al.,[11] Contusion was least in our study Abdominal and chest injuries are relatively uncommon in low height falls but they are more frequent in fatal falls from greater heights. The nature of the surface onto which the victim falls and the degree to which the fall is broken on the way down modify the pattern and severity of injuries.

Most of the study participants in our study had head injury 30% followed by multiple injuries 26%. Regarding the distribution of site of fatal injuries, this study revealed head (30%) and multiple sites (28%) of injury are common. Head was commonly the site of primary impact while secondary impacts may involve different parts of the body resulting in multiple injuries especially with high level falls. In the present study, it was revealed that home as a scene of crime was more common in females, while male falling from height was common in work place. Intracranial hemorrhage was noted in 82% of our study participants. Sub arachnoid hemorrhage was common type noted followed by subdural type. Similar results was observed by Hartshorne,[16]and Goonetilleke,[17] Liver is the common organ to be injured in the abdomen. Heart and kidney damage were uncommon due to natural protective location in human body.

The limitation of this study were single centric study, lack of comparison between rural and urban population, did not mention the measurement of height from fall and substance abuse history was not elicited. Finally the time interval between the injury and death was not noted inthis study.

CONCLUSION

It is concluded that,younger male were the common victims of fall from height. Head was the common site and fracture was the common pattern of injury. This study suggest that, development of self-consciousness in daily activitieswill help to reduce the incidence of fall from height.

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Conflicts of Interest: None.

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ORIGINAL ARTICLE

Split Thickness Skin Graft by Razor Blade: One Year Experience in A District Hospital

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Md. Mozammel Haque,[4] Mohammad Aminul Islam Khan,[5] Md. Joynal Abedin[6]

ABSTRACT

Background: Split thickness skin grafts (STSG) are widely accepted method for soft tissue coverage of open wounds. Historically, this technique has had a significant role in burn wounds, treatment of chronic diabetic ulcers and plastic surgery reconstruction. The set-up for surgery is time-consuming and expensive by using Humby's Knife or Power dermatome. **Objectives:** The aim of this study was to evaluate the feasibility and outcome of split thickness skin graft using universally available and low-cost razor blade. **Methods**: This prospective study included 37 patients with full-thickness skin defects who were enrolled between July 2018 to June 2019. Skin is taken with razor blade. A razor blade was broken into two pieces and half blade was fixed with straight medium size hemostatic forceps. Strip of skin graft were harvested by moving the blade back and forth. Harvested skin grafts were carefully placed over the defect site with care. All patients were evaluated using photographs of donor and recipient site and self-questionnaires. The average follow-up period was 3 months. **Results:** STSGs healed without complications (>90% of the graft take) in 35 patients (94.6%) out of 37 patients. Among this 35 patients minor loss (5%–10% surface) was noted in 11 patients (29.7%) healed without further procedures. Complete loss in 2 patients (5.4%). These two patients required again skin grafting with razor blade and healed without further operative procedures. Donor site wound healing occurs without any complication. **Conclusion:** In the present study, razor blade was used to reconstruct a relatively large skin defect using strips of split thickness skin graft. Using strips of split thickness skin graft harvested with a razor blade can be an easy, simple, and safe surgical method for resurfacing the skin of the defect.

Keywords: Skin graft, Razor blade, One year experience

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INTRODUCTION

Ulcers are the leading cause of hospitalization in patients. Split thickness skin grafts are a well-known and widely accepted method for soft tissue coverage of open wounds.[1] Documentation of its use dates to 3000 bc for the treatment of traumatic facial reconstruction. The first widely used instrument permitting depth control was that developed by Graham Humby in England, prior to World War II. The modern techniques were made by Padgett and Hood in 1939 with the use of electrodermatome and meshing of the graft originally described by Tanner et al.[2] Historically, this technique has had a significant role in burn wounds and plastic surgery reconstruction, but has also been used successfully in the treatment of

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chronic diabetic foot ulcers, healing ulcer and traumatic wounds.[3]

Split thickness skin graft is done by plastic surgeons in tertiary hospitals with Humby knife. This procedure is frequently done by general surgeons in district hospitals by razor blade for small size of wounds. A razor blade is easy to use and does not require additional equipment. Although it is difficult to control the depth of the donor skin, it costs minimum, universally available and does not require set-up time. Because of these advantages, the use of a razor blade has been reported for skin grafting for small wounds.[4]

Although the Split thickness skin grafts (STSG) successfully treats various wound types, a donor site wound is sometimes problematic, and complications such as pain, impaired healing, infection, itching, hypopigmentation, hyperpigmentation and hypertrophic scar often occur. Various approaches to facilitating the healing of a donor site wound have been introduced in several studies.[5] Making multiple small donor site wounds with gap and harvesting strip of skin rather than making one large would induce less post-operative pain and faster wound healing.[6]

The aim of this prospective study is to evaluate the feasibility and outcome of split thickness skin graft using razor blade.

MATERIALS & METHODS

This was a one-year prospective study, conducted in the Department of Surgery, 250 beded Bongomata Shiekh Fozilatunnesa Mujib General Hospital, Sirajganj from 1st July 2018 to 30th June 2019. Study population were patients with full-thickness skin defects admitted and operated in this hospital during the mentioned period. Thirty-seven Patients (37) were selected conveniently. Written informed consent was taken from all the participants. Skin defect more than 30 square cm was excluded from this study. All patients with diabetic foot, burn, cellulitis and trauma were included for this study. Detailed history and thorough clinical examination of the patients was done. Wound size is measured in square cm and photograph is taken. Systemic review was done to see co-morbidity. Baseline and specific investigations especially wound swab for culture sensitivity was done in all patients. A predesigned proforma was used to put down the information gathered. All data were analyzed statistically using SPSS (Statistical Package for Social Sciences) software, version 20.0.

After skin defect debridement, control of infection, appearance of healthy granulation tissue, split-thickness skin grafting was performed. Skin is taken from thigh with razor blade. A razor blade was broken into two pieces and half blade was fixed with straight medium size hemostatic forceps. Strip of skin graft were harvested by moving the blade back and forth (Figure I) Harvested skin grafts were carefully placed over the defect site with care. Fixation is possible using compression without a fixation suture. Graft is covered with Vaseline gauze. Doner site is also covered with vaseline gauze. Five days after operation, the surgical site was opened for the first time and dressing was performed every two days thereafter. Doner site wound open on 12-14 post operative day. All patients were evaluated using photographs of donor and recipient site and self-questionnaires. The average follow-up period was 6 months.

Figure I: Harvesting split thickness skin with razor blade and hemostatic forceps

RESULTS

Over a period of one year, thirty-seven (37) patients with full thickness skin loss were admitted and operated. There were 21 males and 16 females with a male to female ratio of 1.31:1. The age ranged from 23 to 57 years with the mean age of 38.59 years. Most of the patients were found in fourth decade of life (13 cases, 35.1%) (Table 1). Patients of skin loss was due to diabetic foot, burn, cellulitis and trauma. Among them most common was cellulitis (13, 35.1%) (Figure II). Our participants were varying wound size up to 30 square cm. The mean defect size was 15.50 square cm. Most of the patients were wound size between 11-20 square cm (26, 70.3%) (Figure III). Split thickness skin grafts healed without complications (>90% of the graft take) in 35 (94.6%) patients (Figure IV). Among this 35 patients' minor loss (5–10% surface) was noted in 11 patients (29.7%) healed without further operative procedures. On mean day 8.9 after surgery (range, 8- 10 days), healing was complete and an acceptable scar remained (Figure V). Complete loss in 2 patients (5.4%). These two patients required again skin grafting with razor blade and healed without further operative procedures. Doner site wound healing occurs without any complication.

Table I: Age distribution of the patients (n=37)

Age of patients (years)	Number of patients (N)	Percentage (%)
21-30	07	18.9
31-40	13	35.1
41-50	11	29.7
51-60	06	16.2
Total	37	100

Range: 23-57 years; Mean ± SD: 38.59 years.

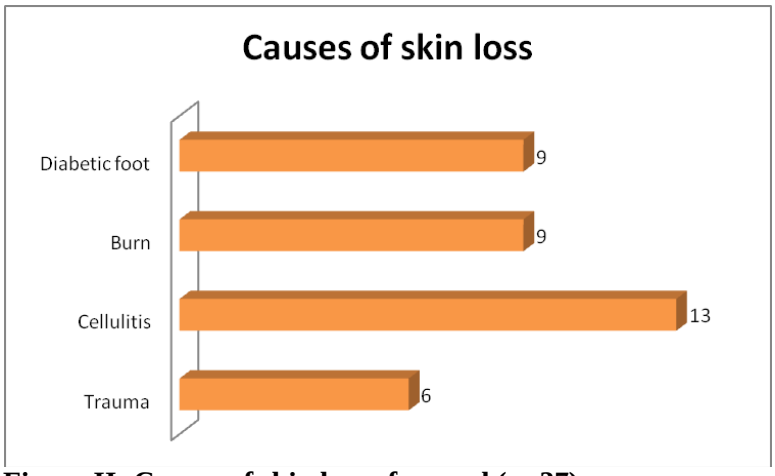

Figure II: Causes of skin loss of wound (n=37)

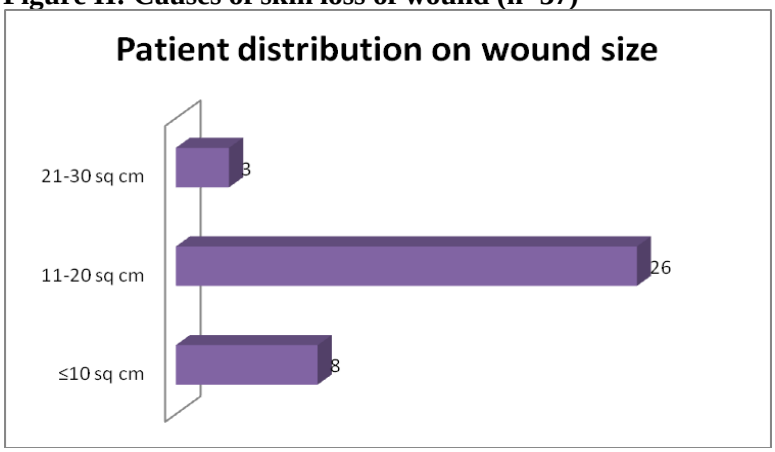

Figure III: Size of wound of the patients (n=37)

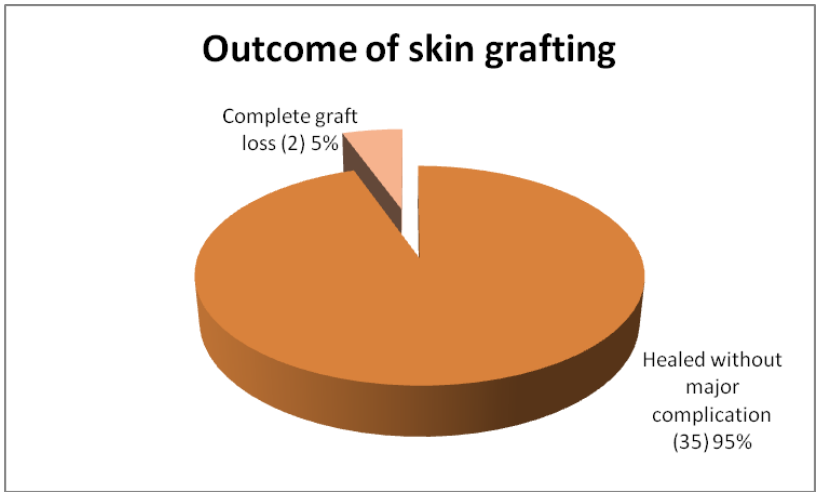

Figure IV: Outcome of skin grafting (n=37)

Figure V: Granulating wound before skin grafting and follow up 3 months after operation

DISCUSSION

Split thickness skin grafting by razor blade is frequently done by general surgeons all over the country due to its availability and low cost. In this study we extend the use of a razor blade for skin grafting and used strips of Split thickness skin graft on a relatively larger defect area. This approach is advantageous for harvesting a graft with a desired size, shape, and thickness, and it involves adjusting the tilting angle and downward pressure, of the razor blade such that there is no need for trimming or defatting.[7]

Graft failure due to a hematoma or seroma did not occur in this study. Even without the use of a large skin graft, the gaps between strips of skin grafts were decreased as epithelialization proceeded to the surrounding area. Although there is no need for suture fixation, only compression bandage was used to ensure fixation.

This study shows healing rate 95% and failure rate 5%. Of the failure both patients were diabetic patient. These patients heal by re grafting with same procedure. Other studies show almost similar results like John J. Anderson et al., in USA showed less than 95% graft take.[3] Neeraj Tripati et al., in India showed 92.3% graft take without major complications.[8]

With this skin grafting technique donor site healing occurred relatively quickly and without complication. The donor site wound had several strips of individual wounds with 3- to 4-mm gap of normal skin between wounds. Strips of doner site induces spontaneousre-epithelialization and decreases the likelihood of hypertrophicscarring during healing becausean individual doner area has independent re-epithelialization potential.

The study was conducted in a constrained time frame, with a limited number of patients and involved only one District hospital in Bangladesh, so the findings may not represent overall existing practice in the country.

CONCLUSION

In the present study, razor blade was used to reconstruct a relatively large skin defect using strips of split thickness skin graft. There was very low complication rate 5.4% which heals again with regrafting. In the remaining cases there was less pain during wound dressing and no complications such as impaired healing, hematoma, seroma, and graft loss. The defect site and donor site wounds healed well. Altogether, using strips of split thickness skin graft harvested with arazor blade can be an easy, simple, cost effective and safe surgical method for resurfacing the skin of the defect.

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ORIGINAL ARTICLE

Atherogenic Indices and Cardiovascular Disease Risk in Different Obesity Phenotype

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ABSTRACT

Background: Obesity, especially visceral obesity, is associated with an increased risk of cardiovascular disease (CVD), in part due to its strong association with atherogenic dyslipidemia. The atherogenic potential of an individual is reflected more accurately by the atherogenic index of plasma (log TG/HDL-cholesterol), cardiac risk ratio (TC/HDL-cholesterol) & atherogenic co-efficient (non-HDL-cholesterol/HDL-cholesterol), rather than individual lipid parameters. **Objectives:** The aim of the study was to evaluate atherogenic indices in the assessment of cardiovascular disease risk among different obesity phenotypes. **Methods:** It was a cross-sectional analytical study conducted from March 2021 to February 2022 at Bangabandhu Sheikh Mujib Medical University (BSMMU). Bynon-probability sampling technique, 404 study subjects were selected. The study subjects were classified into non-obese (reference) group and obese group based on their Body Mass Index (BMI) & waist circumference (WC). The obese study subjects were further categorized into three obesity phenotypes: phenotype-A (obese BMI, non-obese WC), phenotype-B (non-obese BMI, obese WC) & phenotype-C (obese BMI, obese WC). Atherogenic indices (atherogenic index of plasma or AIP, cardiac risk ratio or CRR & atherogenic co-efficient or AC) were calculated using the fasting serum lipid profile results. CVD risks based on atherogenic indices were estimated and compared among different groups. **Results**: The majority of the study subjects were obese with the highest frequency of obesity phenotype-C. The proportion of study subjects with AIP-based CVD risk was the highest in phenotype B, followed by phenotype C, and lowest in phenotype-A. CVD risk based on AC & CRR were similar among the different obesity phenotypes. **Conclusion**: Among obese people, obesity phenotype-B shows maximum CVD risk, obesity phenotype-A shows minimum CVD risk & obesity phenotype-C shows intermediate CVD risk. Obese BMI seems to offer some protection on the CVD risk profile. So, simultaneous measurement of both BMI & WC can provide better prediction of CVD risk status among obese individuals.

Keywords: Cardiovascular disease, Obesity phenotype, Atherogenic index of plasma
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INTRODUCTION

Non-communicable diseases (NCDs) continue to be a major health challenge in all countries, contributing to 70% of all deaths worldwide.[1] Cardiovascular diseases (CVDs) account for the major cause of NCD deaths globally.[2] According to INTERHEART study, Bangladesh has the highest prevalence of cardiovascular risk factors among five South Asian countries.[3] Adipokines released by adipose tissue induce insulin resistance, endothelial dysfunction, hypercoagulability, and systemic inflammation, all of which can promote atherosclerosis & subsequent development of CVDs.[4] Most studies on obesity have used BMI

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or waist circumference (WC) for the measurement of body fat. However, the limited knowledge of the independent effects of BMI and WC on health risk remains controversial. As a result, clinicians face some difficulty in assessing the CVD risk in individuals with different obesity phenotypes concerning general obesity and central obesity.

The atherogenic index of plasma (AIP) is defined as the logarithmically transformed ratio of Triglyceride (TG) to High Density Lipoprotein-Cholesterol (HDL-C), which can act as a marker of lipoprotein particle size.[5,6] Small dense Low Density Lipoprtein (sdLDL), a subtype of LDL, has been described as the main determinant of the atherogenicity of LDL-C. It shows a higher degree of penetration of the arterial wall, a lower affinity for LDL receptors, prolonged plasma half-life & lower resistance to oxidative stress.[7,8] Also, the smaller the size of HDL, the lesser the affinity for scavenger receptors& the lesser the cholesterol efflux from peripheral tissues to HDL.[9,10] AIP shows a negative correlation with the size of HDL & LDL particles.[6,11] Therefore, AIP is a surrogate marker of sdLDL & small HDL, both of which are strongly atherogenic.

Apo-B is present on all non-HDL atherogenic lipoproteins of plasma, whereas apo-AIis present exclusively on the anti-atherogenic HDL. There is a strong association between the apo-B/apo-AI ratio and CHD severity and cardiovascular outcomes.[12,13] Measurement of apo-B & apo-AI is a high-tech expensive laboratory task. It has been reported that there are no significant differences between the apo-B/apo-AIratio and the non-HDL-C/HDL-C ratio for the prediction of carotid atherosclerosis among Chinese individuals with metabolic syndrome.[14] Atherogenic co-efficient (AC) is the ratio of non-HDL cholesterol (Total Cholesterol–HDL-C) to HDL-C. So, AC is a measure of all atherogenic non-HDL cholesterol fractions (VLDL, IDL & LDL) with respect to HDL-cholesterol (good cholesterol).

The total cholesterol/HDL cholesterol ratio, known as the cardiac risk ratio (CRR) has been particularly shown to reflect coronary plaque formation & the thickness of intima-media in the carotid artery of young adults.[15] The Canadian working group has chosen this lipid ratio as a secondary goal of lipid-lowering therapy.[16]

As the measurement of atherogenic lipoprotein subfractions and apolipoproteins (e.g. apo-B, apo-AI etc.) cannot be carried out in all clinical laboratory settings; the lipid ratios can be used instead as a predictive marker for plasma atherogenicity and cardiovascular risk. In several studies, individuals with AIP ≥0.24, CRR ≥5 and AC ≥3 were suggested to be at high risk of cardiovascular diseases in future.[16-18]

WHO has recommended a moderate risk of co-morbidities at BMI 25.0-29.9 kg/m^2 & severe risk of co-morbidities at BMI ≥30.0 kg/m^2 for the Asian population.[17] Therefore to address all obese individuals at high risk of cardiovascular disease; in this study, all participants with BMI ≥25.0 kg/m^2 were grouped together & considered having general obesity. Whereas, individuals with waist circumference ≥90 cm (men) & ≥80 cm (women) were considered centrally obese as per WHO criteria for the Asia-Pacific region.[19]

Different obesity phenotypes seem to be associated with a different degree of cardiovascular risk. This study was designed to evaluate AIP, CRR, and AC for assessment of cardiovascular disease risk in different obesity phenotypes.

MATERIALS & METHODS

This was a cross-sectional analytical study conducted from March 2021 to February 2022 in the Department of Biochemistry & Molecular Biology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka. The study population was all the patients aged between 30 to 50 years with BMI ≥18.5 kg/m^2 attending the out-patient department of BSMMU. Patients with diabetes mellitus, chronic kidney or liver disease, known cases of HTN, ischemic heart disease, transient ischemic attack, stroke, any endocrine disorder or cancer, pregnant women, smokers& alcoholics, and patients taking lipid-lowering drugs or oral contraceptives were excluded from the study. Ethical clearance for the study was taken from the Institutional Review Board of BSMMU before the commencement of this study. Written informed consent was taken from all the study subjects without exploiting any of their weakness.

By non-probability sampling technique, 404 study subjects were selected. Subjects with BMI 18.5-24.9 kg/m^2 and WC for men <90 cm & women <80 cm were designated into the non-obese (reference) group. The obese group included

individuals with BMI ≥25.0 kg/m^2 & / or WC for men ≥90 cm & for women ≥80 cm. The obese study subjects were further classified into three obesity phenotypes: phenotype-A (obese BMI, non-obese WC), phenotype-B (non-obese BMI, obese WC) & phenotype-C (obese BMI, obese WC).

The study subjects were instructed to take an unrestricted diet & usual activities for 3 days prior to the test and to avoid any drug affecting blood lipid level. Finally, they were advised to have overnight fasting (10-12 hours) on previous night of the day of the test. Fasting blood samples were collected in the next morning for estimation of fasting serum lipid profile, FPG, SGPT & serum creatinine. Samples were also collected from study subjects who fulfilled the required criteria for laboratory tests at first meeting. Anthropometric measurements (height, weight & waist circumference) were taken. Height was measured in centimeters with participants standing upright, barefooted on a flat surface. Weight was measured in kg by a portable digital weight scale while participants dressed in light clothing without shoes. Waist circumference was measured in centimeters by a measuring tape in a plane perpendicular to the mid-axillary line at the uppermost border of the iliac crest without compression of skin with minimal adequate clothing. BMI was calculated by dividing body weight in kg by height in meter.^{2} Participants with high FPG, high SGPT & high serum creatinine were excluded. Atherogenic indices (AIP, CRR & AC) were calculated using the fasting serum lipid profile results & CVD risks were estimated.

Risk of CVD based on atherogenic indices:

Atherogenic Index of Plasma (AIP): ≥0.24

Atherogenic Co-efficient (AC): ≥3.00

Cardiac Risk Ratio (CRR): ≥5.00

All data were analyzed statistically using SPSS (Statistical Package for Social Sciences) software, version 20.0. Normally distributed quantitative data were analyzed by unpaired students t-test and one-way ANOVA followed by Bonferroni correction. Whereas, for data with skewed distribution Mann-Whitney U-test & Kruskal Wallis test followed by Dun-Bonferroni pairwise comparison were used. CVD risks based on atherogenic indices among different groups were compared by proportion test. P value ≤0.05 was considered statistically significant. All data were analyzed statistically using SPSS (Statistical Package for Social Sciences) software, version 24.0.

RESULTS

Among total study subjects (404), the majority were obese (315, 78%) and among the obese subjects, obesity phenotype-C (185) was found to dominate (Table I). Phenotype-C (58.7%, 53.3-64.2 95% CI) showed the highest frequency among different obesity phenotypes, followed by phenotype-B (26.3%, 21.5-31.2 95% CI). Whereas, the lowest frequency was observed in phenotype-A (14.9, 11.0-18.9 95% CI). Male subjects (n=144) represented 76.6% in phenotype-A, 62.7% in phenotype-B & 30.3% in phenotype-C. On the other hand, female subjects (n=171) comprised a higher proportion of phenotype-C (69.7%) than phenotype-A (23.4%) & phenotype-B (37.3%). Individuals with CVD risk (based on all atherogenic in dices) were found significantly at higher proportions in obese group, compared to non-obese (reference) group (Table II). With respect to all atherogenic indices, a trend of highest proportion of individuals with CVD risk was found in obesity phenotype-B & lowest in phenotype-A, with obesity phenotype-C in between (Table III). The proportion of individuals with AIP based CVD risk was significantly highest in obesity phenotype-B & lowest frequency was observed in phenotype-A, (Table IV). With respect to CVD risk based on AC, all obesity phenotypes were found statistically identical (Table V). There was also no significant difference in CVD risk based on CRR among different obesity phenotypes (Table VI).

Table I: Distribution of study subjects (adult individuals) with respect to obesity (n=404)

Total Subjects	Non-obese group (reference group)	Obese Group			Total Obese
		Phenotype-A	Phenotype-B	Phenotype-C	
404	89	47	83	185	315 (78%)

Table II: Comparison of CVD (Cardiovascular Disease) risk based on atherogenic indices between non-obese (reference group) & obese individuals (n=404)

CVD Risk	Non-obese (n=89) [Frequency(%)]	Obese (n=315) [Frequency(%)]	p value
AIP ≥ 0.24	18 (20.2)	164 (52.1)	<0.001
AC ≥ 3	33 (37.1)	247 (78.4)	<0.001
CRR ≥ 5	11 (12.4)	138 (43.8)	<0.001

AIP: Atherogenic Index of Plasma; **AC**: Atherogenic Co-efficient; **CRR**: Cardiac Risk Ratio. Proportion test was done to find out the p-value.

Table III: CVD (Cardiovascular Disease) risk based on atherogenic indices among different obesity phenotype (n=315)

Atherogenic Indices	CVD Risk Phenotype-A (n=47) [Frequency(%)]	Phenotype-B (n=83) [Frequency(%)]	Phenotype-C (n=185) [Frequency(%)]
AIP ≥0.24	15 (31.9)	57 (68.7)	92 (49.7)
AC ≥3	34 (72.3)	69 (83.1)	144 (77.8)
CRR ≥5	17 (36.2)	42 (50.6)	79 (42.7)

AIP: Atherogenic Index of Plasma; AC: Atherogenic Co-efficient; CRR: Cardiac Risk Ratio.

Table IV: Comparison of CVD (Cardiovascular Disease) risk based on AIP (Atherogenic Index of Plasma) among different obesity phenotypes (n=315)

Atherogenic Index	Obesity Phenotypes	p value
AIP	Phenotype-A (31.9%) vs Phenotype-B (68.7%)	<0.001
	Phenotype-A (31.9%) vs Phenotype-C (49.7%)	<0.05
	Phenotype-B (68.7%) vs Phenotype-C (49.7%)	<0.05

Table V: Comparison of CVD (Cardiovascular Disease) risk based on AC (Atherogenic Co-efficient) among different obesity phenotypes (n=315)

Atherogenic Index	Obesity Phenotypes	p value
AC	Phenotype-A (72.3%) vs Phenotype-B (83.1%)	>0.05
	Phenotype-A (72.3%) vs Phenotype-C (77.8%)	>0.05
	Phenotype-B (83.1%) vs Phenotype-C (77.8%)	>0.05

Table VI: Comparison of CVD (Cardiovascular Disease) risk based on CRR (Cardiac Risk Ratio) among different obesity phenotype (n=315)

Atherogenic Index	Obesity Phenotypes	p value
CRR	Phenotype-A (36.2%) vs Phenotype-B (50.6%)	>0.05
	Phenotype-A (36.2%) vs Phenotype-C (42.7%)	>0.05
	Phenotype-B (50.6%) vs Phenotype-C (42.7%)	>0.05

A: Obese BMI, Non-obese WC; **B**: Non-obese BMI, Obese WC; **C**: Obese BMI, Obese WC. Proportion test was done to find out the p-value.

DISCUSSION

Cardiovascular diseases including coronary heart disease & stroke, contribute as one of the major causes of obesity related premature death. Most of the research in this regard are still now using genaralized international measures of obesity that do not adequately reflect the different body fat composition & lifestyle of different ethnicity. The main purpose of our study was to determine the status of cardiovascular disease risk based on atherogenic indices (AIP, AC & CRR) in different obesity phenotype. Out of 404 total study subjects, 315 (78%) were obese, having an obese BMI or an obese WC or frequently both. Among the obese subjects, phenotype-C (obese BMI & obese WC) showed the highest prevalence (58.7%). A study done on the Korean population also showed predominance of obesity phenotype-C over the other obesity phenotypes.[20] Weobserved a higher percentage of male subjects in phenotype-A & phenotype-B which reflected their tendency to have higher amount of lean muscle mass & abdominal visceral fat respectively compared to women. Female subjects comprised a higher proportion of phenotype-C which can be supported by having a greater amount of subcutaneous fat than men.[21]

Observed data with respect to all atherogenic indices showed the trend of more CVD risk in phenotype-B & a lower risk in phenotype-A. Statistical analysis revealed that the proportion of study subjects with CVD risk based on AIP was maximum in phenotype-B & minimum in phenotype-A, with phenotype-C in between; but the proportion of subjects with CVD risk based on AC & CRR did not significantly differ among the phenotypes. A study on Korean adults included similar obesity phenotypes. Using the Framingham risk score, they also showed that the 10-year CVD risk was highest in phenotype-B.[20] In a review article, author suggested that people of obesity phenotype-B who are centrally obese (obese WC) with non-obese BMI & atherogenic dyslipidemia had similar, and possibly higher, mortality risk when compared to peoples of obesity phenotype-C who have obese BMI with central obesity (obese WC).[22] Although, in comparison to phenotype-B, the risk status was lower in phenotype A & C, a significant difference was observed between phenotype A & C especially concerned with AIP level. The proportion of subjects with raised AIP was significantly higher in phenotype-C, compared to phenotype-A. These factors pointed out that since the subjects in phenotype-C are centrally obese (obese WC), their high visceral fat might have contributed to the higher risk profile in comparison to phenotype-A, who are not centrally obese (non-obese WC) & thereby having low visceral fat. CVD risk was more profound in phenotype-B, than phenotype-C, despite both of them being centrally obese with high visceral fat, and additionally subjects in phenotype-C are generally obese (obese BMI) with higher amount of total body fat compared to phenotype-B. High total body adiposity in phenotype-C pointed towards the possibility of having higher subcutaneous fat which was also distributed to the abdominal area to make them centrally obese. On the other hand, subjects in phenotype-B were not generally obese (non-obese BMI) that suggested their low level of total subcutaneous fat, but they have plenty of visceral fat. Visceral fat was more linked to atherogenic dyslipidemia, compared to subcutaneous fat. In fact, subcutaneous fat was thought to play a cardio-metabolic protective role even in people with raised BMI & high total abdominal fat.[23] The findings of our study suggested that all obese people did not share the same risk profile. Though obesity is generally thought to increase the cardio-metabolic risk, some evidences suggested that BMI-based obesity may play a protective role & associated with decreased mortality, especially in advanced age. This is also known as the obesity paradox or BMI paradox.[24] In our study, the presence of significantly higher AIP based CVD risk in phenotype-B (non-obese BMI & obese WC) suggested a higher dysfunctional visceral adipose tissue in this group. High BMI (obese BMI) indicates more towards the high muscle mass &/or high subcutaneous fat rather than visceral fat. On the contrary, high WC (obese WC) but normal BMI indicates more towards the high visceral fat content rather than muscle mass &/or subcutaneous fat. Therefore, CVD risk between obesity phenotype B & C needs to be evaluated against the absolute visceral fat content of the two phenotypes to make out the protective or less harmful role of obese BMI on CVD risk. So, special attention should be given to the body fat distribution & different obesity phenotypes while assessing obesity-related CVD risks.

CONCLUSION

This study concluded that, among obese people, cardiovascular disease (CVD) risk differs significantly based on their phenotypes. Obesity phenotype-B (non-obese BMI, obese WC) shows maximum risk, obesity phenotype-A (obese BMI, non-obese WC) shows minimum risk & obesity phenotype-C (obese BMI, obese WC) shows intermediate risk. Obese BMI seems to have some protective role on CVD risk. So, while assessing obesity and its associated cardiovascular risk, BMI & waist circumference (WC) together will provide a more accurate risk prediction than either of them alone.

Conflict of interest: None.

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ORIGINAL ARTICLE

Role of Platelet Rich Plasma (PRP) Therapy on Diabetic Foot Ulcer (DFU): A Prospective Study in Bangladesh

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ABSTRACT

Introduction: Diabetic foot ulcer is a major complication of diabetes mellitus, and is the major component of the diabetic foot. This condition affects up to 15% of all patients with diabetes mellitus. 88% of all lower leg amputations are related to a diabetic foot ulcer. Growth factors from Platelet Rich Plasma (PRP) have shown enhanced wound healing. **Objectives:** To assess the role of PRP therapy on diabetic foot infection. **Methods:** This was a prospective study conducted at Diabetic Foot Care & PRP Center (Diagnostic & Hospital), Sirajganj & Desh PRP Centre, Bogura, Bangladesh from January to June 2022. A total of 65 (sixty-five) patients were included in our study. **Results:** All the cases were diabetes patients. Among the cases male 37 (56.9%) and female were 28 (43.1%). In this study, the age of the patients ranged from 35 years to 75 years. The mean age was 55.0±15.44 years. The 45-65 years age group has the longest diabetic duration. This is statistically significant. The results of the study showed that PRP treatment was successful in 63 out of 65 cases (95.9%), with only 2 cases (3.1%) not achieving complete healing. The most common areas of treatment with significant healing were the back of the right foot (1.5%), the back of the heel of the left foot (9.5%), and the back of the right foot under the little finger (3.2%). **Conclusion:** Foot ulcers have a negative impact on the quality of life of diabetes people. According to the findings of our study, the use of PRP accelerates ulcer healing. These findings demonstrated a viable therapy for foot ulcers. There is a need for more randomized controlled trials to determine the real effectiveness of this therapy.

Keywords: Platelet rich plasma, Diabetes mellitus, Foot ulcer

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INTRODUCTION

Diabetic foot ulcer (DFU) is a major complication of diabetes mellitus and is the major component of diabetic foot. This medical condition affects 15% of all patients with diabetes mellitus. A recent study showed that up to 88% of all lower leg amputations are related to diabetic foot ulcers.[1]A few decades ago, diabetic foot ulcers were treated by vacuum-assisted closure, high voltage pulsed current electrical stimulation and hyperbaric oxygen. Some biological therapies were used in ulcer treatment with an improvement in the time of wound healing.[2] More importantly, the cases of diabetic mellitus patients rapidly increase to 439 million by 2030. The main reason is related to the loss of balance between metalloproteinases (MMPs) and MMP inhibitors.[3,4] This status is enhanced to become serious when combined with ischemia and vascular disease. The vascular injury and ischemia reduced the oxygen and nutrients to the wound.

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So the wound healing mechanism cannot perform as in non diabetic patients. Lack of oxygen and nutrients, epithelial cells in the wound cannot express essential factors for healing such as VEGF and PDGF; almost all of the cells at the wound changed metabolism and activity.[4,5] In recent studies, growth factors from Platelet Rich Plasma (PRP) used for enhancing wound healing were compared to conventional therapies. Wound healing started with the release of local growth factors which attracted stem cells into the wound. PRP decreased cytokine release and increased capillary growth. PRP has also some antimicrobial effects against Candida albicans, MRSA and E. coli.[5-7] These alterations in the structure and function of cells, as well as certain substances at DFUs, slowed and disrupted the normal healing process. Therefore, when diabetes patients develop DFUs, nearly all DFUs cannot be treated, and patients must ultimately undergo lower leg amputation. DFU treatment remains a challenge.

MATERIALS & METHODS

This was a prospective study was conducted at the Department of Transfusion Medicine, Diabetic Foot Care & PRP Center (Diagnostic & Hospital), Sirajganj & Desh PRP Centre, Bogura, Bangladesh from January to June 2022. Sixty-Five (65) patients were included to our study according to the following inclusion and exclusion criteria. The inclusion criteria were patients with DM with planter foot ulcers not healed for more than 3 months, intact distal pulsation and ulcers grade 1 and grade 2 according to Wagner grading system (Figure I). The exclusion criteria were patients with liver cell failure, renal impairment, heart failure, severe cardiomyopathy, bleeding or platelet disorders, malignancies or short life expectations, peripheral vascular disease, major lower limb amputations, low immunity or corticosteroid therapy and ulcers (grade 3, grade 4 and grade 5). Full medical and surgical history taking, general assessment, vascular examination and neurological assessment were done for all patients. Laboratory investigations (pre-operative), x-ray foot, arterial duplex and culture from the ulcers were done routinely. All patients signed the consent. On an outpatient basis, debridement was done for all ulcers, optimization of the patients‟ general conditions, broad-spectrum antibiotics first then based on culture were described. The size of ulcers was recorded before treatment and every week till complete healing. Offloading for all cases by total contact cast was done. For PRP preparation 25 mL of the patient's blood was collected. The blood was centrifuged at 2000 rpm for 5 min to obtain plasma. Then, this plasma was centrifuged at 3000 rpm for another 5 min to collect platelets at (37 Celsius). Platelets were diluted in 5 mL plasma to form PRP and the rest of the plasma is now considered as Platelet Poor Plasma (PPP). Both were activated by Calcium chloride which leads to gel formation for dressing, and PPP was stored for injection (Figure II). Ulcers were dressed with fibrin gel on the first day. After 3 days daily till the end of the first-week injection with activated PPP Was done. If after 2 weeks, still there is no healing, the procedure can be repeated again (Figure III).

Figure I: Fore foot ulcer

Figure II: Injection of PRP

Figure III: Healed ulcer Preparation of Platelet-rich plasma

We used a PRP kit (Secquire kit SK50-20) that included sodium citrate tubes, syringes, needles and centrifuge tubes. There were four steps to platelet collection: i. blood sample collection ii. Centrifugation iii. Activation iv. Platelet gel making. The process took 30–45 minutes, from blood collection to the end infusion. Blood (30–40ml) was collected from the patient in 3.8% sodium citrate tubes. The blood was centrifuged (at 1400–1800rpm for 10–12 minutes) after which platelets were carefully removed from above the buffy coat with a sterile pipette and transferred to a new sterile tube. Platelet activation was induced by adding 20mM calcium chloride solution (CaCl2) in a ratio of 1 CaCl2:5 PRP by volume, followed by centrifugation at 3000rpm for 10–15 minutes. Collect in between 2/3rd and 1/3rdarea of the test tube and PRP ready for use. The resulting supernatant was shaken for 30 minutes to form a coagulum. This coagulum, or "platelet gel", was used for wound treatment like ointment on wound area.

Statistical analysis: Data were collected and tabulated and statistical analysis was done with p-value recorded as a significance indicator. The significance of the changes in time for wound healing in the three groups was statistically assessed using a one-way analysis of variance, followed by Bonferroniposthoc multiple comparison by SPSS 20.0 (SPSS Inc., Chicago, IL, US). This CI, being narrow, shows more precise estimates, whereas CIs from small sample sizes tend to be wide, producing less precise results.

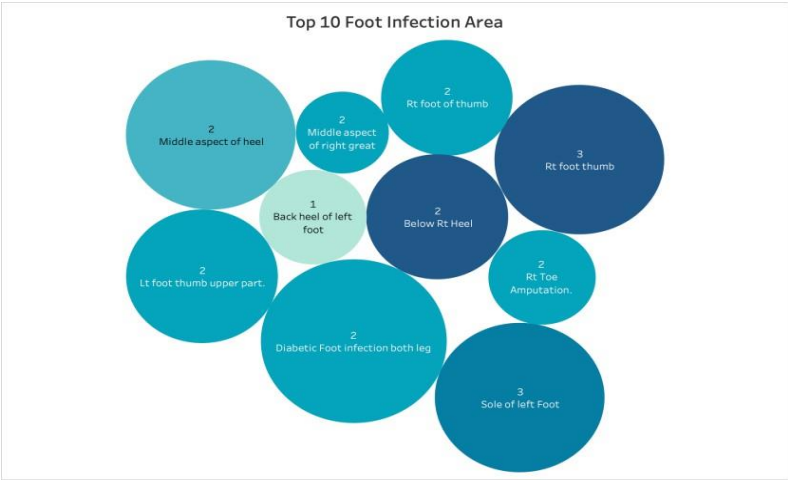

Figure IV: Foot infection area

RESULTS

Total 65 patients were enrolled. All the cases were diabetes patients. In this study, the age of the patients ranged from 35 years to 75 years and the maximum number of cases. Mean age of 55.0±15.44 years. Diabetic history was highest from 45 years to 65 years age group. This was statistically significant. No significant association between the pre-existing medical condition and the distribution among the groups (Figure V). Regarding sex distribution, male 37 (56.9%) and female were 28 (43.1%). Male patients were significant (Figure VI). The infection length side was highest at 6 cm and 4 cm and an average of 2 cm was on both sides (Figure VII). Duration and dose of PRP among the infections area showed that back heel left foot 3 months 1 (1.5%), Back of middle aspect of heel 3 months 1 (1.5%), Back of the foot rt side 1 months 6 (9.5%), Back of the heel left foot 2 months 1 (1.5%), Back of the rt foot in under the little finger 2 months 2 (3.2%), Bellow rt heel 6 months 3 (4.8), Between the front of the middle toe 4 months 2 (3.2%), Diabetic foot infection both leg 6 months 2 (3.2%), Diabetic foot infection lt leg 6 months 1 (1.5%), Diabetic foot infection on 3 months 5 (7.9%), Index toe 2 months 2 (3.2%), Left foot middle finger 4 months 1 (1.5%), Left great toe 12 months 2 (3.2%), Left foot back side 4 month 3 (4.8), Left foot back 4 months 1 (1.5%), Left foot lateral part 6 months 2 (3.2%), Left foot thumb 1 months 2 (3.2%), Left foot thumb and index finger 5 months 5 (7.9%), Left foot thumb upper part 8 months 4 (6.3%), Middle aspect to heel 8 months 2 (3.2%), Middle aspect to right great toe 5 months 8 (12.7%), Right foot of thumb 6 month 6 (9.5), Right foot thumb 15 month 4(6.3%), Rt toe amputation 8 months 6 (9.5) and Sole of left foot 6 months 4 (6.3%) (Figure VIII). PRP dose success rate showed that complete healing were 63 (95.9%) and treatment failwere 2 (3.1%).

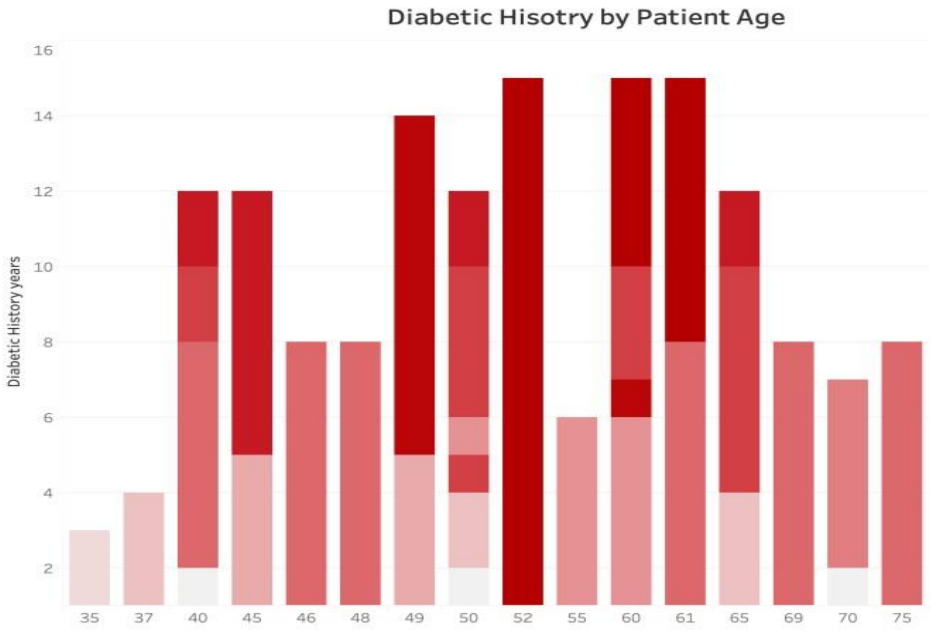

Figure V: Age distribution of diabetic history of patient's age (n=65)

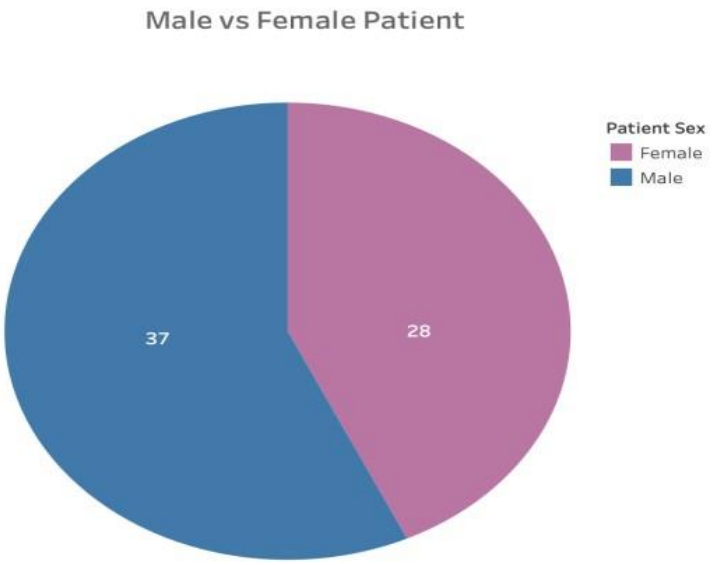

Figure VI: Sex distribution of diabetic history of patients age (n=65)

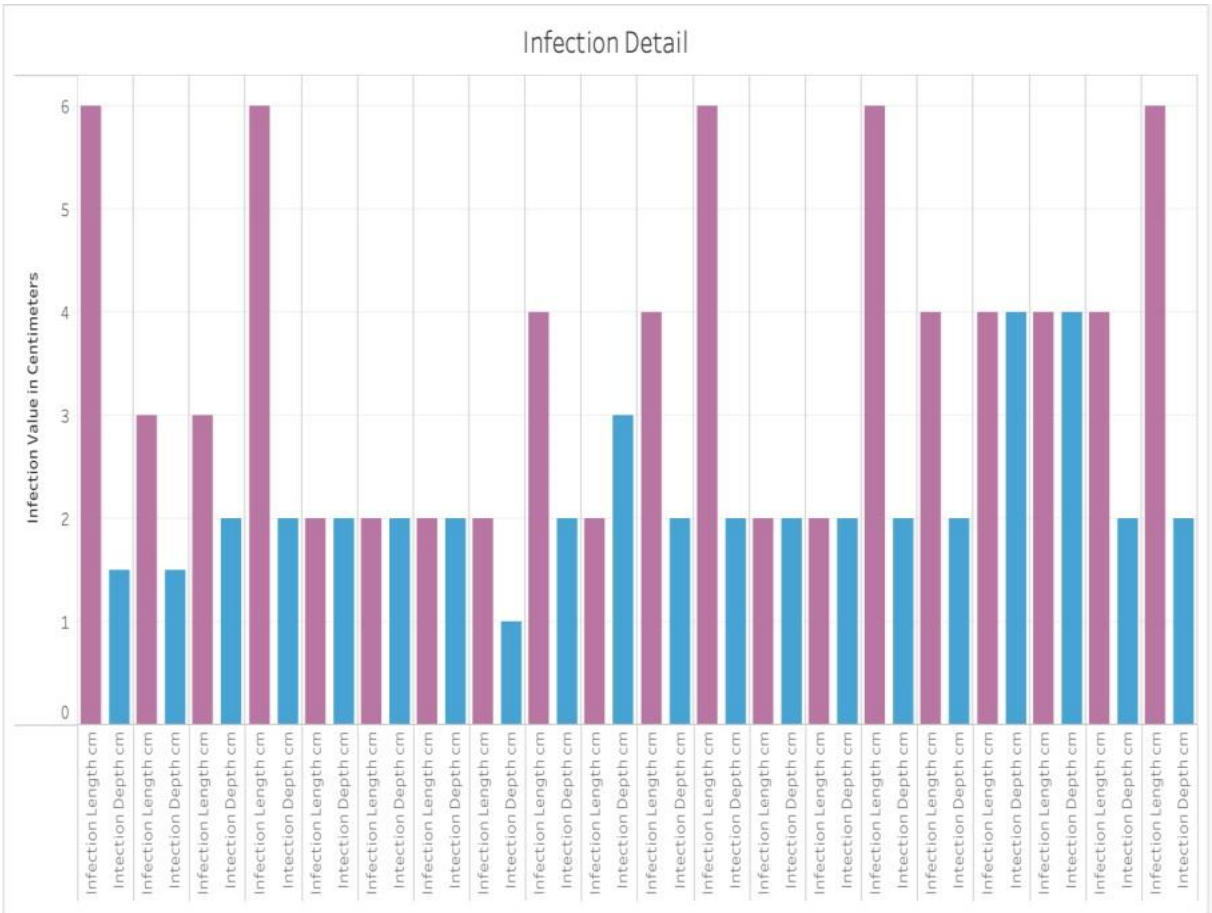

Figure VII: Infection detail of the diabetic history of patients (n=65)

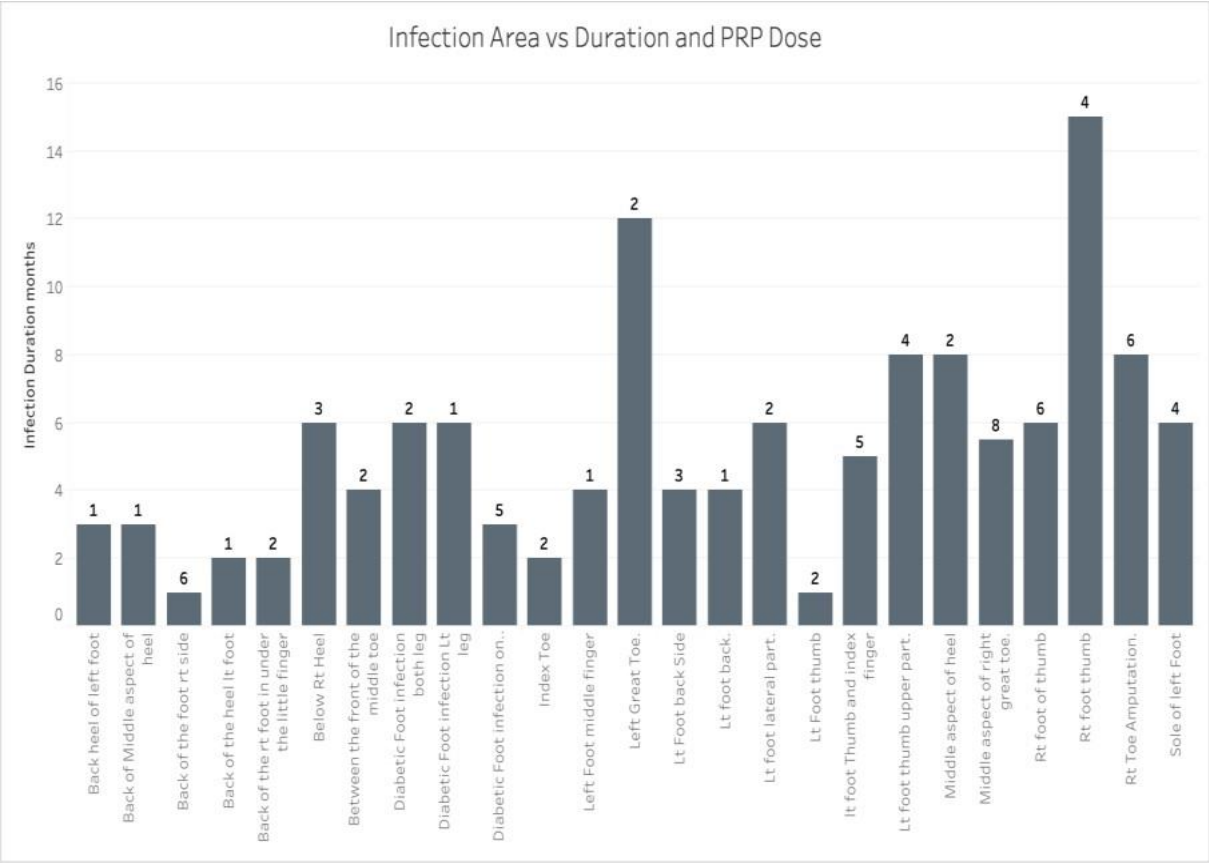

Figure VIII: Infection area vs duration and PRP dose of diabetic patients (n=65)

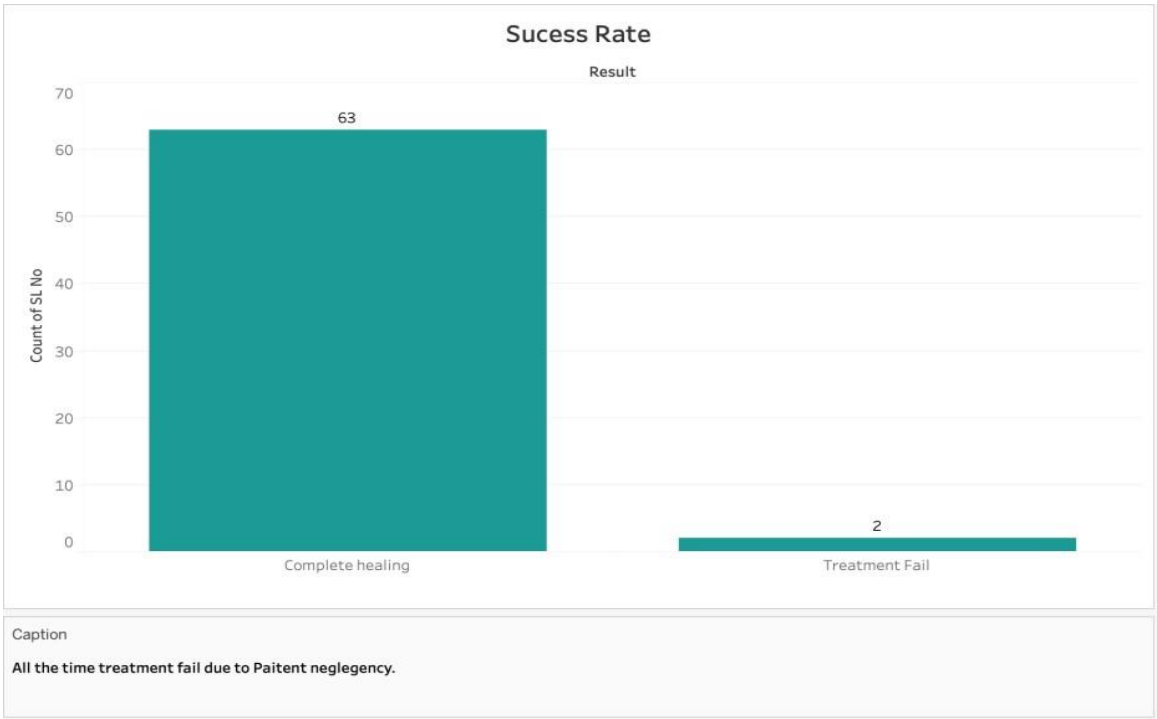

Figure IX: Success rate of PRP dose of diabetic patients (n=65)

DISCUSSION

One of the most common causes of ulcers is growth factor abnormality. Platelets are considered a rich source of growth factors. PRP enhance wound healing by either the barrier effect to prevent bacterial invasion into the wound or the growth factors stimulating wound healing.[4]A total of 65 patients were enrolled. Mean age of the patients was 55.0±15.44 years. Diabetic history from 45 years to 65 years was the highest age group. Male and female were 37 (56.9%) and 28 (43.1%) respectfully. Various types of PRP systems exist with variable platelet, leukocyte, and growth factor concentrations. Chronic inflammatory responses against foreign invaders are made possible by leukocytes including lymphocytes, monocytes, neutrophils, eosinophils, and basophils. Recent evidence has shown that leukocyte levels within PRP may have controversial effects on wound healing.[8] Of the studies included in the review, Perez Zabala et al.,[9] reported using leukocyte-poor PRP with high average healing rates of 1.46 cm2/wk. Complication rates after the topical application of PRP were low. Besides the 2.2% incidence of transient wound infections and 0.3% incidence of contact dermatitis, no other adverse effects were reported. The complication rates were significantly lower compared to the 11.1% incidence of wound infection and 0.8% incidence of skin maceration among patients receiving conventional wound treatment. However, further higher-quality studies with randomized controlled trials are necessary to justify the use of PRP over more cost-effective treatment methods. Most publications apply PRP only on the wound but we apply both activated PRP and PPP. Plasma Rich Protein enrich the wound with multiple growth factors for cell migrations and neo-angiogenesis while PPP contains nutrients for healing.[10] Figure VIII showed detailed results of different areas affected and treated. Saad et al.,[11] compared the results of both PRP and PPP on ulcer healing and showed that healing in PRP group was faster ($P < 0.005$) than PPP. Our findings mirrored those of Lone et al.,[12] who used PRP to treat DFUs. They showed that 62.85% of patients developed granulation tissue by the end of the second week and 77.78% of patients reached 100% granulation at the end of the 3rd week.[13]Also, McAleer et al.,[14] reported good results of PRP in chronic foot ulcers in a 57-year-old man. Another study reported the synergistic effect of both autologous adipose tissue and PRP in a case study of a diabetic 65-year-old male patient who had a foot ulcer for 3 years.[15] Scimeca et al.,[16] published the successful result for the treatment of chronic plantar diabetic ulcers in a 49-year-old man using PRP.[17] Figure IX showed that the PRP dose success rate of complete healing is 63 (95.9%) and treatment fall 2 (3.07%). A retrospective cohort of 599 patients with diabetic foot ulcers was published and reported complete healing in 50% of patients undergoing PRP treatment and 41% of patients not treated with PRP.[18] Future studies can improve by designing more prospective comparative trials, increasing study sizes, and standardizing clinical outcome measures such as healing rates, percentage of ulcers completely healed, and ulcer area at baseline and final follow-up. Another possible limitation of this review is that other relevant studies on this topic could have been excluded, despite conducting a systematic search.

CONCLUSION

Foot ulcers affect the quality of life of diabetic patients. In our study, the results confirm that the use of PRP and PPP increases the ulcer healing rate. These results provided a promising method for ulcer treatment. The future of PRP therapy is promising and still evolving. PRP is being used increasingly in fields such as dermatology, cosmetic surgery, and dentistry, as well as sports medicine and orthopedics. Further randomized controlled studies that show clinical outcome improvement in multiple parameters are necessary to evaluate the true efficacy of this treatment.

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