

Original Article

Effects of Oat Supplementation on Glycemic Status of Type 2 Diabetes Mellitus Patients

Hossain F¹, Begum D², Fatema K³, Apu SA⁴, Halder S⁵, Ferdous S⁶

Abstract

Background: Type 2 diabetes mellitus (DM) is a metabolic disorder characterized by insulin resistance. Insulin is required for glucose uptake, storage and utilization by liver, muscle and adipose tissue. Type 2 DM patients have increased fasting plasma glucose and glycated Hb (HbA1c) level. Maintenance of healthy diet plays an important role in the management of type 2 DM. Oat prevents the complications of type 2 DM by reducing insulin resistance.

Objectives: The aim of this study was to observe the effects of oat supplementation on fasting plasma glucose and HbA1c level of type 2 Diabetes Mellitus patients.

Methods: A prospective interventional study was done in Dhaka Medical College from July 2021 to June 2022. Total eighty diagnosed type 2 DM patients of both genders age ranging 35-60 years were selected on the basis of inclusion and exclusion criteria. Among them forty type 2 DM patients without oat supplementation were considered as control group. Another forty age and gender matched type 2 DM patients with oat supplementation (60gm/day) for 12 weeks were considered as study group. Fasting plasma glucose (FPG) and HbA1c were estimated at the beginning of the study and after 12 weeks of study period in control and study groups.

Results: Fasting blood glucose and HbA1c levels were significantly decreased in study group after 12 weeks of oats supplementation in comparison to that of their baseline value and also in comparison to the control group.

Conclusion: Regular supplementation of oats improves glycemic status in type 2 DM patients.

Key words: Diabetes mellitus, oat, glycemic status.

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Introduction

Diabetes mellitus is a serious, long-term condition characterized by hyperglycemia due to inadequate insulin production or insulin function or both. Insulin is an essential pancreatic hormone which allows glucose entry from blood to body's cell. Lack of insulin or cell's inability to respond to insulin, leads to hyperglycemia, which clinically indicates Diabetes Mellitus¹.

According to World Health Organization² and International

Diabetes Federation (IDF)¹ the modified diagnostic criteria for diabetes are: (one or more of the following criteria are met) fasting plasma glucose: ≥ 7.0 mmol/L (126 mg/dL), two-hour plasma glucose after 75g oral glucose load (oral glucose tolerance test (OGTT)): ≥ 11.1 mmol/L (200 mg/dL), HbA1c: ≥ 48 mmol/mol (equivalent to 6.5%), Random plasma glucose in the presence of symptoms of hyperglycemia: ≥ 11.1 mmol/L (200 mg/dL).

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The main pathophysiology of type 2 Diabetes Mellitus is insulin resistance and β cell failure. In Bangladesh, the prevalence of Diabetes Mellitus is 8.4% in adult population³. According to IDF, about 537million adults (20-79years) worldwide (10.5%) are diabetic.¹ Life style modification and drug treatment constitutes treatment regimen of DM³.

Oat is a unique cereal due to its nutritional attributes since ancient time. Consumption of oat has been related to lower the risk of cardiovascular diseases and prevention of cancer, type 2 Diabetes Mellitus and gastrointestinal diseases⁴. β -glucan is the principal component of soluble dietary fiber in oat⁵. Oat β -glucan due to its low glycemic index (GI), helps to prevent the cause of development of type 2 Diabetes Mellitus and Coronary Heart Disease⁶.

Pino et al. (2020) observed that oat supplementation reduced HbA1c significantly in study group in comparison to control group. Fasting blood glucose level remained stable during the study period⁷. Tessari and Lante (2017) found that following treatment with oat, fasting glucose level reduced non-significantly but HbA1c levels reduced significantly in the study group in comparison to the control group⁸. Li et al. (2016) observed a significant reduction in fasting blood glucose and HbA1c in oat intervention group⁹. McGeoch et al. (2013) found no diet-related effects of oats on glycemic status¹⁰.

From the above studies, it has been revealed the effect of oat supplementation on glycemic status of type 2 DM patients are contradictory and not conclusive regarding. Therefore, the aim of this study was to evaluate the effects of oat supplementation on glycemic status of type 2 DM patients.

Materials and Methods

This prospective interventional study was carried out in the Department of Physiology, Dhaka Medical College, Dhaka from July 2021 to June 2022. A total of eighty diagnosed type 2 DM patients of both genders with age 35-60 years were selected from outpatient Department of Endocrinology, Dhaka Medical College Hospital, Dhaka. Among them forty type 2 DM patients without oat supplementation were considered as control group. Another age and gender

matched forty patients of type 2 DM with oat supplementation (60gm/day) for 12 weeks were considered as study group. Study subjects were allocated in the study group and control group randomly.

Inclusion criteria were diagnosed patients of type 2 DM patients according to IDF and WHO 2021 of both genders with age ranging 35-60 years. All the diabetic patients were on same oral hypoglycemic drug (Metformin). Exclusion criteria were pregnancy and lactation, patients who were on insulin therapy, steroid and OCP, patients with endocrine disorder other than DM, patients with recent or past history of myocardial infarction, heart failure, severe hypertension (BP:>180/110mm Hg), renal and liver disorders, patients with concurrent acute illness including infectious diseases and malignancy, smoking and alcohol intake and known allergic to oat.

All the patients of type 2 DM of the study group were supplemented orally 60 gm of oats per day (60gm/day) for 12 weeks¹⁰. Oats were purchased from local market. The brand of oat was Quaker oats. 1kg oats container pot of Quaker oats with supplied measured cup was given to the study group for every 17days interval and they were encouraged to consume the supplied oat daily. 60 gm oats were measured by supplied measuring cup. A person can consume 1kg of oat for 17 days. Each subject of the study group was supplied a total of 5kg oats (5 container of 1kg Quaker oats) during 12 weeks of study period. A regular telephonic contact and periodic visit was taken to supply oats and to ensure compliance with intervention. Empty containers of oat and the amount of oats in the container were checked to understand that the subjects were consuming the oats regularly.

With all aseptic precaution, 6ml of venous blood was collected from ante-cubital vein by 10cc disposable plastic syringe from each subject after an overnight fast (at least 12 hours). From that sample 2ml whole blood was taken in a test tube with EDTA anticoagulant for estimation of HbA1c. The remaining blood was transferred in a de-ionized glass test tube and was kept in slanted position till formation of clot. Then blood sample was centrifuged at a rate of 3000 rpm for 10 minutes for separation of serum. After that, supernatant serum was collected in labeled ependrof tube and preserved in a refrigerator below -20°C

until analytical measurement of fasting plasma glucose, serum creatinine and serum ALT were done. Serum creatinine and serum ALT were done to exclude renal and liver disease respectively. Analytical measurement was done into the Department of Laboratory Medicine, Dhaka Medical College Hospital, Dhaka. Measurement of fasting glucose and glycated hemoglobin levels were done in all the subjects of both control and study groups at the beginning of the study (baseline) and after 12 weeks of oat supplementation in the study group and without any oat supplementation for 12 weeks in the control group. Fasting plasma glucose was estimated by the hexokinase-glucose-6-phosphate dehydrogenase method and reading was taken by Dimension® Automated Biochemistry Analyzer. Percentage of HbA1c was measured in whole blood by turbidimetric immuno-inhibition method and reading was taken by Dimension® Automated Biochemistry Analyzer method.

The research work was carried out after obtaining ethical clearance from concerned departments, Research Review Committee and Ethical Review Committee of Dhaka Medical College, Dhaka. Statistical analysis was performed by using a computer based statistical program SPSS (Statistical package for social science) version 23. Results were expressed as mean and standard deviation SD (mean $\pm$ SD). p value <0.05 was considered as level of significance. Paired student's 't' test was performed to compare quantitative data between baseline and after 12 weeks within same group and unpaired student's 't' test was performed to compare quantitative data between control and study groups. Chi square test was performed to compare qualitative data between control and study groups.

Results

In this study, total 80 patients were included. Among them 77 patients completed this study. 3 patients from the study group were excluded due to their personal reason. General characteristics of the study population was shown by age (years), gender (percentage), systolic blood pressure (mmHg) and diastolic blood pressure (mmHg). (Table-I)

Fasting plasma glucose showed no significant difference in the control group after 12 weeks in comparison to their baseline value and also in comparison to the study group.

Fasting plasma glucose significantly reduced in the study group after 12 weeks of oat supplementation in comparison to their baseline value and also in comparison to the control group. (Table-II)

HbA1c levels showed no significant difference at baseline between the control group and the study group and also in the control group after 12 weeks from their baseline value. Glycated hemoglobin levels significantly reduced in the study group after 12 weeks of oat supplementation in comparison to their baseline value and also in comparison to the control group. (Table-III)

Table-I: General Characteristics of the subjects in control and study groups (N=77)

Parameters	Control group (n=40)	Study group (n=37)	p-value
Age (years)	46.7 $\pm$ 7.7 (35 -59)	46.4 $\pm$ 7.6 (31 -59)	>0.05 NS
Gender			
Male	18(53%)	16(47%)	>0.05 NS
Female	22(51%)	21(49%)	
Systolic BP (mmHg)	124.5 $\pm$ 6.4 (110 -130)	122.8 $\pm$ 8.4 (110 -140)	>0.05 NS
Diastolic BP (mmHg)	79.8 $\pm$ 7.3 (70 -90)	79.9 $\pm$ 5.3 (70 -90)	>0.05 NS

Results were expressed as mean $\pm$ SD. Unpaired Student's 't' test was performed to compare age, systolic BP and diastolic BP between control and study groups. Chi Square test was performed to compare gender between control and study groups. The test of significance was calculated and p value <0.05 was accepted as level of significance. N = total number of study population, n=number of study subjects in each group.

Table-II: Fasting plasma glucose (FPG) in study and control groups (N=77)

Parameters	Fasting blood glucose (mmol/L) Control group (n=40)	Fasting blood glucose (mmol/L) Study group (n=37)	p-value
At baseline	8.3 $\pm$ 0.9 (7.0 -10.0)	8.1 $\pm$ 0.7 (7.0 -10.0)	>0.05 NS
After 12 weeks	8.4 $\pm$ 1.1 (7.2 -12.0)	6.6 $\pm$ 0.7 (5.5 -8.3)	<0.05 S
p value	>0.05 NS	<0.05 S	

Results were expressed as mean $\pm$ SD. Range was mentioned inside parenthesis. Paired t test was done for comparison between baseline and after 12 weeks within same group. Unpaired t test was done to compare between control and study groups. p value <0.05 was accepted as level of significance. N= total number of study population, n= number of study subjects in each group.

Table-III: Glycated hemoglobin (HbA1c) in study and control groups (N=77)

Parameters	HbA _{1c} (%)		p value
	Control group (n=40)	Study group (n=37)	
At baseline	7.3 $\pm$ 0.9 (6.6 -10.0)	7.3 $\pm$ 0.6 (6.5 -10.0)	$>0.05^{\text{NS}}$
After 12 weeks	7.3 $\pm$ 0.9 (5.7 -10.0)	6.3 $\pm$ 0.6 (5.0 -8.4)	$<0.05^{\text{S}}$
p value	$>0.05^{\text{NS}}$	$<0.05^{\text{S}}$	

Results were expressed as mean $\pm$ SD. Range was mentioned inside parenthesis. Paired t test was done for comparison between baseline and after 12 weeks within group. Unpaired t test was performed to compare between control and study groups. p value <0.05 was accepted as level of significance. N=total number of study population, n=number of study subjects in each group.

Discussion

The objective of the present study was to observe the effects of oat supplementation on glycemic status in patients with type 2 DM. In the present study, it was observed that fasting plasma glucose and glycated hemoglobin levels were significantly decreased in the study group after 12 weeks of oats supplementation in comparison to that of their baseline value and also in comparison to the control group. These findings are compatible with several authors^{9,11-13}. It may be due to the fact that oat forms a highly viscous solution which reduces gut motility and delays gastric emptying. As a result, slow release of glucose from stomach to intestine prevents sharp rise and make sustained rise of glucose. Moreover, highly viscous oat solution forms an unstirred layer in the wall of intestine that prevents digestion and absorption of glucose. Furthermore, oat inhibits glucagon activity, thereby prevents glycogenolysis and gluconeogenesis in liver. In addition,

oat undergoes anaerobic bacterial fermentation in colon and produces short-chain fatty acids (propionic and butyric acid). These short-chain fatty acid (SCFA) increases expression of glucose transporter type 4 (GLUT-4) via peroxisome proliferator-activated receptor (PPAR) γ in muscle and adipose tissue. GLUT-4 is responsible for facilitated diffusion of glucose from blood to the muscle and adipose tissue. Cumulative effect of all these mechanisms decreases the risk of development insulin resistance which is the main pathophysiology of type 2 Diabetes Mellitus¹⁴⁻¹⁶.

On the contrary, Cugnet-Anceau et al. (2009) found no significant reduction in fasting plasma glucose and HbA_{1c} following oat supplementation for eight weeks¹⁷. Similarly, Kabir et al. (2002) observed no significant reduction in fasting blood glucose and HbA_{1c} levels after oat supplementation for 4 weeks¹⁸. It may be due to the fact that oat supplementation should be at least for 12 weeks to get the beneficial effect.

One of the strengths of the study was that the study subjects were randomly allocated in the study group as well as in the control group and the period of observation was long (12 weeks) for better interpretation of the effect of oat supplementation. However, the number of the study population was small, male and female were not taken on equal ratio in both groups and the amount of Insulin secretion and the degree of Insulin resistance was not measured.

Conclusion

Findings of the present study proves that oat supplementation for at least 12 weeks reduces the fasting blood glucose as well as the glycated hemoglobin levels. It indicates that oat supplementation is beneficial for long term glucose homeostasis because glycated hemoglobin represents at least six weeks of blood glucose level. This finding proves that oat supplementation improves glycemic status in type 2 diabetes mellitus. As a result, oat supplementation may be recommended in Diabetes Mellitus patients for better management of the disease, to reduce the requirement of drug and to minimize the complications of the disease. However, it is recommended for the assessment of HOMA-IR (Homeostasis model assessment-insulin resistance) and level of oxidative stress to detect the mechanism of action of oat to improve insulin sensitivity and to decrease insulin resistance.

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Original Article

Surgical Management of Venous Malformation- A Prospective Observational Study

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Abstract

Background & objectives: Venous malformations (VM) are congenital vascular anomalies that persist throughout life and require treatment due to associated complications like pain, swelling, and bleeding. This study aims to evaluate the surgical management of venous malformations. **Materials & methods:** This prospective observational study was conducted at the Department of Burn, Plastic, and Reconstructive Surgery, Shaheed Suhrawardy Medical College Hospital, Dhaka, Bangladesh, to evaluate the outcomes of surgical treatment for VM. Based on inclusion & exclusion criteria, a total of 22 lesions from 15 patients were surgically excised and monitored over a 6-month period. **Result:** The study found that 90.9% of cases achieved complete excision with low complication rates (13.6%) and a recurrence rate of 13.6%. Although factors like previous treatment, lesion size, and type of excision influenced recurrence rates, these associations were not statistically significant. **Conclusion:** The study highlights the effectiveness of surgical management for VM, emphasizing the need for extended follow-up to better understand long-term outcomes.

Keywords: Venous malformations, vascular anomalies, surgical excision, recurrence.

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Introduction

Venous malformations (VM) are rare vascular anomalies present at birth¹. These abnormal veins grow with the patient and cause a variety of problems, including pain, swelling and bleeding. Unlike hemangiomas, which regress on their own, VM are persistent and require treatment². VM are the most frequent type (65%) of all vascular malformation which affects 1.5% of general population. Most of them (93%) are sporadic and unifocal, although 1% are multifocal. Inherited forms comprised of cutaneomucosal venous malformations VMCs (1%) and glomuvenous malformations (GVMs, 5%) are often multifocal³. There is no sex preponderance. VM can occur

anywhere in the body, but commonly appear in the head and neck area, muscles or extremities⁴. Presentation varies widely, ranging from a small birthmark to a life-threatening condition. VM grow proportionally with the patient and do not shrink. They consist of thin-walled, abnormal veins that lack proper muscle support, causing them to dilate over time. These malformations can involve just one tissue or spread across multiple layers, affecting muscles, nerves and even bone¹. VM show a predisposition to thrombosis, forming phleboliths, which are pathognomonic of VM and are diagnostic on imaging studies. Their unpredictable nature and potential for

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complications make diagnosis and treatment challenging⁵.

Several treatment approaches include both surgical & non-surgical methods. This common clinical problem in surgical discipline and results of surgical excision of venous malformation was not studied extensively in Bangladesh. Surgical procedures for VM prioritize correcting abnormal blood flow and reducing pressure within the malformation⁹. This might involve reconstructive surgery to improve drainage by venous bypass or removal of problematic veins. Secondary issues like muscle contractures or cosmetic concerns are typically addressed after the primary vascular problem is resolved¹⁰. Complex VM often requires multidisciplinary team approach to achieve the best outcome².

This prospective observational study, conducted at the Department of Burn, Plastic and Reconstructive Surgery of Shaheed Suhrawardy Medical College Hospital, Dhaka in Bangladesh, aims to evaluate the surgical management of venous malformations.

Methods

This prospective observational study was conducted at the Department of Burn, Plastic, and Reconstructive Surgery, Shaheed Suhrawardy Medical College Hospital, Dhaka, Bangladesh from July 2018 to June 2019. The inclusion criteria were all the patients attending respective department with vascular malformation of all age groups and involved area including anywhere in body and exclusion criteria was severe co morbidities like uncontrolled DM and severe hypertension. A total of 22 lesions from 15 patients with venous malformations were included, selected through purposive sampling. Patients underwent preoperative assessments, including blood tests and imaging (duplex ultrasound, MRI/MRA). Surgical excision was performed, followed by postoperative monitoring for 6 months. Data were collected in preformed data sheet & analyzed using Microsoft Excel 2010, with significance set at $p < 0.05$. Written informed consent was obtained from all participants.

Results

In this study of 15 patients, the age distribution revealed a mean age of 20.5 years (SD ± 8.72). The majority of cases were in the 24-31 years age group (46.67%), followed by

8-15 years (40%) and 16-23 years (13.33%). Lesions primarily appeared after the age of 10 years (60%), with fewer cases emerging between 2-10 years (33.33%) and 0.5-2 years (6.67%). Gender distribution showed a higher prevalence of females (60%) compared to males (40%).

In the preoperative assessment of 15 patients, 40.9% had previously received treatment for their venous malformations, while 59.1% had not. Clinically, all lesions exhibited compressibility and lacked pulsation. Lesions were most commonly located in the head and neck (40.9%), followed by the lower limb (31.8%) and upper limb (27.3%). Most patients presented with a single lesion (86.7%), with only 13.3% having multiple lesions. Lesion sizes varied, with 81.8% measuring between 0-15 cm², 13.6% between 15-30 cm², and 4.5% exceeding 30 cm², averaging 10.3 cm² (SD ± 12.66).

90.9% of the 22 cases underwent complete surgical excision, while 9.1% had partial excisions. Wound coverage was achieved primarily through direct closure in 90.9% of cases, with flap coverage used in 9.1%. Postoperatively, 86.4% of patients experienced no complications, whereas complications were observed in 13.6% of cases. These complications were partial wound dehiscence (4.5%), complete wound dehiscence (4.5%) and hematoma (9.1%) (Fig-4). At the final follow-up after 6 months, 86.4% of patients had no recurrence of lesions, while 13.6% experienced recurrence.

The association between recurrence of venous malformations and various factors was examined in 22 patients. Previous treatment did not significantly influence recurrence rates; 33.33% of patients without prior treatment experienced recurrence compared to 66.67% with previous treatment ($p = 0.544$) (Table I). Similarly, lesion size had no significant impact on recurrence; lesions ≤ 15 cm² had a recurrence rate of 33.33%, whereas those > 15 cm² had a rate of 66.67% ($p = 0.073$) (Table II). The type of surgical excision also showed no significant association with recurrence. Recurrences occurred in 66.67% of cases with complete excision and 33.33% with partial excision ($p = 0.259$). These findings suggest that while various factors were assessed, none demonstrated a statistically significant correlation with recurrence rates (Table III)

Table I : Distribution of cases according to association between recurrence and previous treatment (n=15)

Previous treatment	Recurrence		No recurrence		Total		P value
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	
Not received	1	33.33%	12	63.16%	13	59.09%	
Received	2	66.67%	7	36.84%	9	40.90%	
Total	3	100.00%	19	100.00%	22	100.00%	.544 ^{ns}

P value was calculated with Fisher's exact t test. ns = not significant

Table II: Distribution of cases according to association between recurrence and size of lesion (n=22)

Size (in cm ²)	Recurrence		No recurrence		Total		P value
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	
≤15	1	33.33%	17	89.47%	18	81.82%	
>15	2	66.67%	2	10.53%	4	18.18%	
Total	3	100.00%	19	100.00%	22	100.00%	0.073 ^{ns}

P value was calculated with Fisher's exact t test. ns = not significant

Table III: Distribution of cases according to association between recurrence and type of surgical excision (n=22)

Type of excision	Recurrence		No recurrence		Total		P value
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	
Complete	2	66.67%	18	94.74%	20	90.91%	
Partial	1	33.33%	1	5.26%	2	9.09%	
Total	3	100.00%	19	100.00%	22	100.00%	.259 ^{ns}

P value was calculated with Fisher's exact t test. ns = not significant

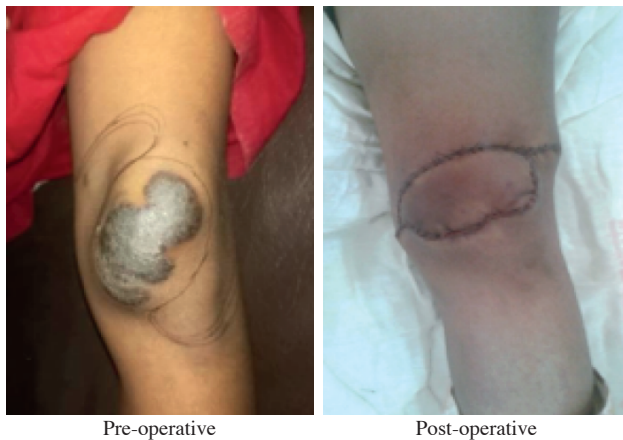


Figure: 01



Figure: 02



Figure- 03: Post op outcome



Figure -04: Complications after surgery

Discussion

Surgical excision remains the preferred treatment for venous malformations (VMs), offering the most promising chance for a cure despite the complexities involved. Extensive lesions pose significant challenges due to their ill-defined nature and the risk of intraoperative bleeding, which complicates the identification and preservation of vital structures. The study conducted at ShSMCH from July 2018 to June 2019 evaluated the surgical outcomes for 15 patients with 22 lesions, adhering to strict inclusion and exclusion criteria.

The study's demographic data revealed that the majority of patients were aged between 24 and 31 years (46.67%), with a mean age of 20.47 ± 8.717 years, spanning from 8 to 31 years. These findings are consistent with previous research, such as that by Akita et al. (2014) and Steiner et al. (2013), which reported mean ages of 27.6 ± 21.16 years and 31 years, respectively. This suggests that the age distribution in the current study is comparable to that observed in other studies^{11,12}.

Lesion onset varied, with 60% of cases developing after age 10, 33.33% between ages 2 and 10, and 6.67% from 0.5 to 2 years. This timing aligns with Wojcicki and Wojcicka's (2014) findings, which noted that VMs are often present at birth or in early childhood but may become more noticeable later due to factors such as hormonal changes or trauma¹³.

Gender distribution in this study showed a slight female predominance (60%) with a male-to-female ratio of 1:1.5, reflecting findings from other studies that also noted a slight female predominance in VM cases, although some epidemiological research indicates no significant gender difference^{11,13}.

Treatment history revealed that 59.09% of lesions had not received prior treatment, while 40.9% had undergone sclerotherapy or a combination of sclerotherapy and compression. The dissatisfaction with sclerotherapy leading to surgical intervention is consistent with Naik and Karandikar's (2018) study, where similar issues prompted a switch to surgery¹⁴.

All lesions in this study were compressible and non-pulsatile, consistent with the typical clinical presentation of VMs¹⁵. Anatomical distribution showed that 40.91% of lesions were in the head and neck region, 31.82% in the lower limb, and 27.27% in the upper limb. These findings are in line with studies by Akita et al. (2014) and Steiner et al. (2013), though this study did not include lesions in the torso, which aligns with the epidemiological data showing that a significant proportion of VMs are located in the head and neck region^{11,12}.

Regarding lesion count, 86.67% of cases involved single lesions and 13.33% had multiple lesions, aligning with Domp Martin et al. (2010), who found that the majority of vascular anomalies are unifocal, and Kang et al. (2017), who reported a lower incidence of multifocal VMs^{4,16}.

The study focused on lesions deemed excisable, with 81.82% measuring between 0 and 15 cm², 13.64% between 15 and 30 cm², and 4.55% larger than 30 cm². The mean lesion size was 10.28±12.66 cm². This distribution underscores the challenge of excising larger lesions, as they often require careful management to prevent intraoperative complications and ensure functional and aesthetic outcomes. The findings reflect the necessity of surgical intervention for larger lesions, particularly when sclerotherapy alone is inadequate¹⁷(Figure 1,2,3)

Complete surgical excision was achieved in 90.91% of cases, with partial excision in the remaining 9.09%. This high rate of complete excision contrasts with other studies, such as those by Kang et al. (2017) and Roh et al. (2012), where partial excision was more common. The increased success rate of complete excision in this study may be attributed to the relatively smaller size of the lesions^{16,18}.

Postoperative wound management was successful in 90.91% of cases with direct closure, while flap coverage was required in 9.09% of lesions. These results are consistent with Roh et al. (2012), who achieved direct closure in 87.5% of cases and utilized flaps sparingly¹⁸.

Complications occurred in 13.64% of cases, including partial wound dehiscence and hematoma, with one case experiencing both (Figure 4). These complication rates are comparable to those reported by Steiner et al. (2013) and

Kang et al. (2017), who documented similar frequencies of complications, indicating that the current study's outcomes are consistent with established findings^{11,16}.

Recurrence was observed in 13.64% of lesions. This recurrence rate aligns with Roh et al. (2012), who reported a 10% recurrence rate. The follow-up period of this study was only 6 months, and it is possible that a longer follow-up might reveal higher recurrence rates. The data also showed that lesions which had received prior treatment or were larger than 15 cm² had a higher tendency for recurrence, although these findings were not statistically significant (p values of 0.544 and 0.073, respectively). Partially excised lesions showed a higher recurrence rate, but this was also not statistically significant (p = 0.259), with one partially excised case remaining stable during the follow-up period despite having intraorbital extension^{16,18}.

The study reinforces the efficacy of surgical excision as a treatment for VMs, highlighting the high rate of complete excision and manageable complication rates. However, it also emphasizes the need for extended follow-up to fully assess recurrence rates and outcomes, particularly in cases with larger lesions or those that have received prior treatment. The results are consistent with existing literature but also provide new insights into the factors influencing surgical success and recurrence.

Conclusion

The surgical management for venous malformations are generally satisfactory, with low complication and recurrence rates. Further extensive study with longer follow up period may be done.

Conflict of interests: None

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Original Article

Diagnostic Accuracy of Fine Needle Aspiration Cytology in Evaluating Head and Neck Masses

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Abstract

Background: Fine needle aspiration cytology (FNAC) is a widely used diagnostic technique for examining various types of lesions, including head and neck swellings.

Objective: Aim of this study is to evaluate the accuracy of aspiration cytology as a first-line diagnostic tool in palpable head and neck masses to correlate with histologic results for evaluating diagnostic accuracy.

Materials and Methods: A total of 250 patients underwent FNAC and 219 patients underwent both FNAC & histopathological examination (HPE). FNAC was performed on the palpable masses of the head and neck regions and was compared with biopsy findings of the same lesions. Sensitivity, specificity, positive and negative predictive values and accuracy rates were evaluated. Results: Among the patients, 96(38.4 %) cases of lymph node, 88(35.2 %) cases of thyroid gland, 17(6.8 %) cases of salivary gland, 26(10.4 %) cases of cyst and 23(9.2 %) cases of soft tissue and miscellaneous swellings were present. In the present study, sensitivity and specificity were 76.26% and 93.55%, respectively. Positive and negative predictive values and accuracy rates were found 98.84, 35.38, and 78.40%, respectively.

Conclusion: Fine-needle aspiration cytology (FNAC) is an initial diagnostic procedure has shown to have a high accuracy in diagnosis of head and neck lesions.

Keywords: Fine Needle Aspiration Cytology (FNAC), Head and Neck, Lymph Node, Salivary Gland, Thyroid Gland, HPE

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Introduction

Neck swelling is a prevalent concern frequently encountered in routine ENT (Ear, Nose, and Throat) clinical practice. Fine Needle Aspiration Cytology (FNAC) has emerged as a widely used diagnostic tool for evaluating these swellings due to its numerous advantages. It is minimally invasive, well-accepted by patients, cost-effec-

tive and offers a high degree of diagnostic accuracy. Moreover, FNAC plays a pivotal role in preventing unnecessary surgical interventions by providing rapid and reliable preliminary diagnostic insights¹. Over time, FNAC has become integral to the diagnosis of various neoplastic and non-neoplastic conditions, including malignancies.

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This technique involves using a fine-gauge needle to extract cells or tissues from a suspicious lesion, which are then examined microscopically to determine their nature—malignant, benign, or inconclusive. Its utility has grown substantially in clinical settings because of its simplicity, reproducibility, and minimal complications². The application of FNAC in diverse medical centers has been extensively studied, and several researchers have reported their observations regarding its diagnostic precision and applicability. Specifically, its correlation with histopathological examination (HPE) has garnered considerable attention. However, the literature reflects some variability in outcomes, with certain studies highlighting discrepancies in FNAC results when compared to HPE findings³. These inconsistencies underscore the need for institution-specific evaluations to refine the technique's accuracy and enhance its clinical utility⁴. FNAC has limitations such as sampling errors, lack of histological details, and difficulty differentiating between similar tissue types, with accuracy highly dependent on operator skill. To improve its effectiveness, proper training, imaging guidance for sampling, combining it with other diagnostic methods, and standardizing protocols are recommended. Studying FNAC accuracy in Bangladesh was important because it's widely used for diagnosing common diseases. Improving its reliability helps patients get better care without needing costly tests. The present study aims to analyze the correlation between cytopathological findings obtained through FNAC and histopathological examination (HPE) of lesions in the head and neck region. By doing so, it seeks to evaluate the diagnostic effectiveness of FNAC from the perspective of our institution, contributing valuable insights to existing knowledge and practice.

Materials and Methods

This was a cross-sectional study conducted in the Department of ENT & Head-Neck Surgery at Rangpur Medical College Hospital. The study period spanned from July 2020 to June 2022. A total of 250 patients underwent FNAC, and 219 patients underwent both FNAC and histopathological testing. Patients presenting to the ENT outpatient department (OPD) with clinically significant

head and neck masses, including chronic lymphadenitis, salivary gland masses, cystic masses, and suspected malignant masses, were selected for the study. FNAC was performed regularly as part of their diagnostic workup. Patients with head and neck masses who underwent both FNAC and histopathological diagnostic procedures, complete case files and pathology records, including patient demographics (age, sex), anatomical site of the lesion, FNAC diagnosis, and histological diagnosis were included in this study. Incomplete patient records, Hypo-cellular or acellular FNAC smears, Cases with prior FNAC, surgery, or biopsy of the lesion, Proven malignant or benign lesions excluded based on prior diagnostic procedures were excluded from this study. The FNAC procedure involved cleaning the skin over the lesion, inserting a fine needle attached to a syringe, and aspirating cellular material from the target site. The collected sample is then smeared onto glass slides, stained, and examined under a microscope for diagnosis. Imaging techniques like ultrasound used for better accuracy in sampling deep or inaccessible lesions. Data from patients with both FNAC and histological results were included in the final analysis. Data analysis was carried out using: IBM SPSS Version 26.0 (IBM SPSS Statistics Inc., Chicago, IL, USA). Microsoft Excel 2019 for data organization and preliminary analysis.

Results

The participants' age and sex distribution is shown in Table I; the majority of them were between the ages of 21 and 40, and the ratio of female to male participants was close to 2:1. The youngest and oldest patients in the series ranged in age from 3 to 86. The average age was around 34.12 (21-40).

Table- I: Age and Sex distribution of participants

Age Group	Female	Male	Total
<20	27 (16.7%)	26 (29.5%)	53 (21.2%)
21-40	93 (57.4%)	33 (37.5%)	126 (50.4%)
41-60	27 (16.7%)	15 (17%)	42 (16.8%)
>60	15 (9.3%)	14 (15.9%)	29 (11.6%)
Total	162 (100%)	88 (100%)	250 (100%)

The current study's organ-by-organ FNAC diagnosis is shown in Figure 1's pie chart. There were 96(38.4%) cases of lymph nodes, 88(35.3%) cases of thyroid glands, 17(6.8%) cases of salivary glands, 26(10.4%) cases of cysts, and 23(9.2%) cases of soft tissue and other swellings.

In Figure 2, the performance of the FNAC in various age groups according to sex is displayed. Males older than 60 are more likely to develop malignant lesions, whilst women in the age range of 21 to 40 are substantially less likely to do so.

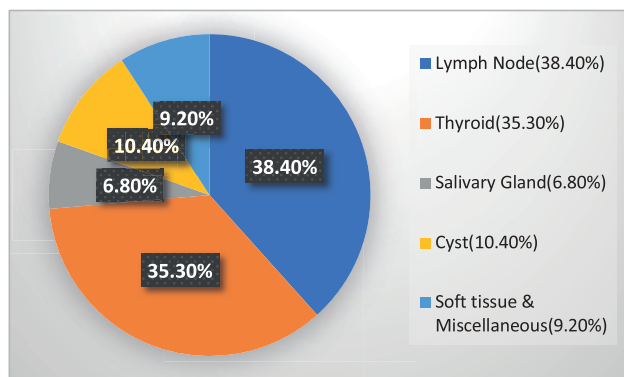


Figure 1: Pie Chart of Organ wise FNAC diagnosis

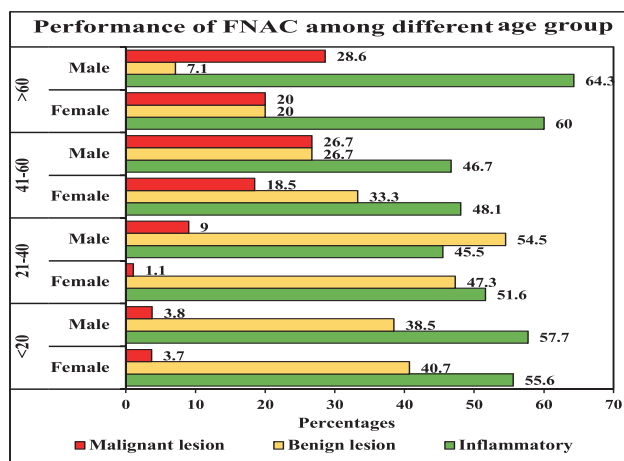


Figure 2: Performance of FNAC among different age group based on sex

Table II provides a comprehensive overview of cytological diagnoses across distinct organ sites. A significant proportion of lymph node cases 86(34.4%) reveal inflammatory conditions, contrasting with the thyroid where benign findings predominate 67(26.8%). Salivary gland and cyst cases exhibit a blend of inflammatory and benign diagnoses. In contrast, soft tissue and miscellaneous lesions predominantly show inflammatory patterns & not a single case of malignancy seen. In summary, 129(51.6%) cases inflammatory, 102(40.8%) cases benign & 19(7.6%) cases malignant found.

Table-II: Organ wise distribution of cytological diagnosis

Site of lesions	Cytological diagnosis					
	Inflammatory		Benign		Malignant	
	No. of cases	Percentage (%)	No. of cases	Percentage (%)	No. of cases	Percentage (%)
Lymph Node	86	34.4%	00	0%	10	4%
Thyroid	13	5.2%	67	26.8%	08	3.2%
Salivary Gland	07	2.8%	09	3.6%	01	0.4%
Cyst	02	0.8%	24	9.6%	00	0%
Soft tissue & miscellaneous	21	8.4%	02	0.8%	00	0%
Total	129	51.6%	102	40.8%	19	7.6%

Table III reveals the correlation between Fine Needle Aspiration Cytology (FNAC) and histological diagnoses for different organ sites. Notably, in lymph nodes, 24(67%) of reactive cases correlate with histology, while thyroid

cases demonstrate a 63(71.6%) correlation. Across 250 cases, 66.8% exhibit correlation, 20.8% do not and 12.4% lack available data, emphasizing the nuanced relationship between FNAC and histological outcomes.

Table-III: Organ wise FNAC diagnosis correlation with diagnosis

Diagnosis by FNAC	Correlation with diagnosis			
	Total no (%)	Correlated with Histology	Not correlated with Histology	Not available (%)
Lymph node				
▪ Reactive	35	24	08	03
▪ Inflammatory	30	15	05	10
▪ Tubercular	14	11	03	00
▪ Metastatic	10	05	04	01
▪ Lymphoma	07	02	05	00
Salivary Gland	17	08	07	02
Thyroid gland	88	63	11	14
Cyst	26	21	04	01
Soft tissue & miscellaneous	23	18	05	00
Total cases	250	167	52	31

Discussion

Diagnostic accuracy of FNAC varies according to different lesions of head neck areas. FNAC is found to be a simple, cost effective and rapid diagnostic tool for assessing various head-neck masses. Preoperative cytological diagnosis of benign or malignant neoplasm will guide the surgeon to select an appropriate surgical procedure.⁵ Our study involved 250 cases of head and neck masses that underwent FNAC, and 219 of these cases underwent both FNAC and histopathological examination (HPE). The lesions were categorized as inflammatory, benign, or malignant based on cytological findings, which were then correlated with histopathological diagnoses. Head and neck masses can occur at any age. In our study, lesions were observed in patients aged 3 to 86 years, with a mean age of 34 years. The majority of cases occurred in the 3rd to 4th decades of life. These findings are consistent with studies by V.K.

Poorey and Amit Tyagi⁶. All cases were analyzed based on their history, clinical presentation, examination findings, FNAC, and HPE. Of the 250 cases, FNAC revealed 129 (51.6%) inflammatory lesions, 102 (40.8%) benign lesions, and 19 (7.6%) malignant masses. In the benign category, our findings align with the study conducted by V.K. Poorey and Amit Tyagi. However, 31 cases had no available histopathological reports and were excluded from the correlation analysis.

The 19 (7.6%) malignant cases comprised a small proportion of the total. The distribution of head and neck masses in our study included 96 (38.4%) cases of lymph node involvement, 88 (35.2%) thyroid cases, 17 (6.8%) salivary gland cases, 26 (10.4%) cysts, and 23 (9.2%) cases of soft tissue and miscellaneous lesions. These findings align with the study by Ramesh S et al⁷. Additionally, 10 (4%) cases

of lymphoma were reported out of 96 lymph node cases, which is consistent with the findings of Mohamed et al⁸, who reported 9 cases of lymphoma out of 225 lymph node aspirates.

Regarding thyroid lesions, 88 cases were identified, including 67 (26.8%) benign, 8 (3.2%) malignant, and 13 (5.2%) inflammatory lesions (e.g., Hashimoto's thyroiditis, chronic lymphocytic thyroiditis, and De Quervain's thyroiditis). Our findings did not fully align with other studies on thyroid lesions, possibly due to the smaller sample size in our study. Among salivary gland lesions, 17 cases were identified, of which 9 (3.6%) were benign and 1 (0.4%) was malignant not consistent with Shalley S et al⁹. This also did not correlate well with other studies, likely due to variations in sample size. Of the 26 cystic lesions, 2 (0.8%) were inflammatory, and 24 (9.6%) were benign, findings consistent with the study by Jadhav DS et al¹⁰.

In our study, 21 (8.4%) cases of soft tissue and miscellaneous lesions were inflammatory, while 2 (0.8%) were benign. No similar studies were available for correlation with these findings. The overall sensitivity, specificity, and diagnostic accuracy of FNAC in our study were 76.26%, 93.55%, and 78.40%, respectively, which correspond to the findings of Suryawanshi, K. H & Fernandes et al^{11,12}. There were some limitations of this study. The relatively small number of cases for certain lesion types (e.g., salivary gland, cystic lesions) may reduce the generalizability of findings. Patients included in this study might not represent the full spectrum of head and neck masses seen in other geographic or health-care settings. Hypocellular or acellular smears, as well as incomplete records, were excluded, which might skew the overall accuracy results. A lack of long-term follow-up data to verify the accuracy of FNAC findings in certain cases limits the understanding of its prognostic value. Findings are derived from a single institution and may not reflect practices or results from other centers.

Conclusion

Fine Needle Aspiration Cytology (FNAC) is a reliable, minimally invasive diagnostic tool for head and neck masses, with high specificity (93.55%), sensitivity 76.26% and overall accuracy (78.4%). It aids clinical decision-making, offering valuable insights while reducing unnecessary surgeries. Ultrasound-guided FNAC for deeper or non-palpable lesions, which may enhance diagnostic yield.

Conflict of interests: None

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Original Article

A Comparative Study of Outcome of Split Thickness Skin Graft Between Dressing Removal on Day 3 and Day 5

Bhowmick N¹, Sarker B², Jubery TAGMZ³, Rashid MH⁴, Rahman MA⁵, Alam MT⁶, Akhter T⁷

Abstract

Background: Split thickness skin graft is a commonly used surgical procedure which involves transfer of epidermis & part of dermis from donor area to recipient area. The common causes of skin graft failure are formation of hematoma, seroma and infection. These affect graft take in initial postoperative period. Early postoperative dressing removal during this period helped in detection & evacuation of hematoma, Seroma & thereby improving graft survival rate.

Objective: To see the outcome of removal of dressing done on 3rd POD and 5th POD following Split thickness skin graft.

Materials & Methods: A prospective observational study was conducted among 96 patients in two groups in the department of Plastic surgery, DMCH from August 2022 to July 2023. In group A, postoperative dressing was removed on day 3 and in group B on day 5. The Grafted site was inspected after 2 days of dressing removal and at 14th POD. The grafted site was then assessed on for the percentage of graft take, hematoma, seroma, infection clinically and through culture and sensitivity.

Results: The mean graft take in group A was 99.57% whereas in group B was 97.05% after dressing removal in day 3 and day 5 and after 2 days of dressing removal, mean graft take in group A was 99.31% whereas in group B was 96.16%, in 14th POD, group- A was 97.02% whereas in group B was 95.23% with statistically significant data and thus showing less graft loss and infection rate in group A. Seroma was present in 7.3% of cases in group A and 9.4% in group B after dressing removal. Hematoma was present in 4.2% in Group A and 5.2% in group B. Rate of infection was 8.3% in Group A and 16.7% in group B.

Conclusion: Early postoperative dressing removal done on Day 3 following STSG significantly increased the graft take & also reduced seroma, hematoma and infection.

Keywords: STSG, Postoperative dressing, Graft take, Graft loss

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Introduction

Skin is the largest human organ in the body, about 15% of total adult body weight. Its function are protection, thermoregulation, sensation, absorption & control of evaporation.¹ Now a days STSG is one of the most operative procedure to surface of trauma, burn wounds,

chronic ulcers etc. Split thickness skin grafting is a minimally invasive, simple, durable and cost effective method of treatment of diabetic foot ulcers as compared with the conservative regular dressings.²

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STSG also can be used when the defect area is too large to be covered by flap only or full thickness skin graft.³ When the graft is harvested, it no longer receives any nutrients and oxygen from its host blood supply. When the graft is unsuccessful in adhering to the wound site and revascularization via angiogenesis or any other factors impede this process, the graft may failure.⁴ Following skin grafting, graft will survive on a defined sequence of events that ends up in vascular independence. These sequences are serum imbibition, in first 24 to 48 hours then inosculation, in next 24 to 72 hours and finally angiogenesis, which starts after 72 hours.⁵

The outcome of a graft depended mainly on the extent and speed at which vascular perfusion are restored in between the donor and recipient tissue. When the graft is unsuccessful in adhering to the wound site and revascularization via angiogenesis or any factors that impede this process such as fluid collection under the graft or mechanical shear forces causes the graft failure.

Many studies have been performed investigating about the factors that involved in split thickness skin graft take. However, most common causes of skin graft failure are hematoma & seroma formation, infection and movement (shear) at recipient area. Maximally these factors affected the graft take in the initial postoperative period by impairing the graft adherence to the wound bed and subsequent revascularization.⁵ Usually the postoperative dressing is left in graft site for 3-5 days before removal. Fluid collection may occur beneath the graft will create a mechanical barrier in case of graft attachment. Hematoma or seroma may formed and this fluid must be removed.³ Hematoma, seroma and blood clots form under the graft in the early postoperative period of 1-3 days, impaired the graft adherence and prevented revascularization and impaired the graft take. That's why, inspection and postoperative dressing removal done during this period will help in evacuation of the hematoma, seroma, blood clots and graft can be reapplied if it has been disrupted from the graft site thereby causes improvement of revascularization and graft survival rate.¹¹ Early removal of dressing also reduces the incidence of infection. The chance of infection can be monitored and appropriate management started, if the graft was inspected in early postoperative period.¹²

Very few Studies have conducted concerning this issue especially the impact of first dressing removal on the graft take are lacking, with a few number of studies done which suggested the exact timing of the dressing removal after skin graft. In this study, relevance of dressing removal on day 3 and day 5 after the surgery and its effect on graft take, graft loss and the complications connected to graft loss in patients undergoing split thickness skin grafting was evaluated.

Materials and Methods

It was a prospective observational study conducted in department of Plastic Surgery, Dhaka Medical College Hospital from August 2022 to July 2023. Sample size was 96.

Sampling technique was purposive sampling. Sampling is carried out during the study period on patients need STSG as per inclusion and exclusion criteria. Patients who needed split thickness skin graft to cover burn, trauma wounds having clean and healthy granulating bed were included in this study. Patients who undergoing grafts for second time on same site, preoperative wound culture and sensitivity showing streptococcus pyogenes and patients with severe co-morbidities (Peripheral vascular disease, Venous ulcer, Immunosuppression) were excluded from this study.

Patients were operated under general anesthesia or spinal anesthesia. Surgical sites were aseptically draped in standard fashion. Then the recipient bed was prepared by wound excision. The donor site was chosen from thigh. Applied chlorhexidine on donor site. The split-thickness graft was harvested from the thigh using Humby's knife. The graft was meshed properly and fenestration was done in case of sheet STSG. Then graft was applied on the prepared recipient area and secured with skin staplers. The grafted area was covered with sterile antibiotic impregnated sofra tulle and upon which sterile dressing and pressure bandage was applied. In case of limb immobilization was secured by plaster cast. In case of trunk, chest, abdomen immobilization was secured by tie over dressing. Donor site was covered with antibiotic-impregnated sofra tulle and pressure bandage was applied. Standard postoperative management carried out. The patients were distributed into two groups as group A and group B, by allotting alternatively

for doing the dressing removal on day 3 and day 5 respectively. The grafted site was assessed by observing presence of seroma, presence of hematoma and swab from the grafted area was sent for culture and sensitivity test. For measuring the area of graft a transparent plastic sheet and a marker pen were used. The transparent sheet was placed over the graft area. With the help of a marker pen, marked the boundaries of the graft area.

After marking on the transparent sheet, cut the outline of area of graft with a scissor and place the marked sheet over a graph paper and secured with a stapler so that the marked sheet could not move here & there to affect reading of calculated area. Then outline was marked by a pencil.

For calculation of area of graft, count the number of complete large square, complete medium square and small squares beyond the marked area. The area for grafting is calculated by using the following formula given:

"Area " ("in c" "m" ^"2")="Number of complete large square+"

"1" /"4" "×Number of complete medium square+" "1" /"100" "×Number of small square"

The percentage of graft uptake was calculated by using the following formula.

Total area of graft and area of graft take was measured by using graph paper.6

"Percentage of graft uptake=" "area of graft uptake" /"total area of graft" "×100"

Percentage of graft take was calculated and percentage of graft loss was calculated in day 3, day 5, day 14 for group A and in day 5, day 7, day 14 for group B.

Following the data collection phase, a comprehensive master table was meticulously compiled as the initial step in organizing the collected data. Utilizing standard formulas, the statistical analysis of the results was conducted

using a computer software system based on the Windows platform, specifically designed with the Statistical Package for Social Sciences (SPSS-27).

In presenting the findings of this study, continuous variables were represented using the mean and standard deviation, providing a measure of central tendency and dispersion, respectively. Association between continuous variables were assessed using unpaired T test. Meanwhile, categorical variables were conveyed through the presentation of frequency and percentage distributions, offering a comprehensive overview of the distribution patterns within the studied parameters. Association between the categorical variables were assessed by Chi square test. $P < 0.05$ was considered for statistical significance. This methodological approach enhances the clarity and interpretability of the results, allowing for a nuanced understanding of both the central tendencies and the variability within the dataset.

Results

The analysis of participant demographics revealed a distribution of gender within the study groups. In group A, comprising 48 individuals, 38 were male (79.17%), while 10 were female (20.83%). In group B, with an equal number of participants, demonstrated 32 males (66.67%) and 16 females (33.33%).

In group A, the majority of participants aged 25-34 years (37.50%). On the other hand, group B exhibited a more diverse age distribution, with a significant proportion in the 25-34 years range (33.33%) and a comparable number in the 35-44 years category (33.33%).

The commonest cause of STSG in both groups were attributed to burns, with 24 cases (50.0%) in group A and 22 cases (45.8%) in group B. Considering the co-morbidities, the incidence of DM was 87.5%, HTN was 12.5%. The lower limb was the most common recipient site (58.3%), followed by the trunk (18.8%), upper limb (15.6%)

Table I: Percentage of graft take after dressing removal of the patients in group A and group B (n=96)

Variable	Group A (Day 3)	Group B (Day 5)	P value
Percentage of graft uptake after dressing removal	99.57 (± 0.19)	97.05 (± 0.69)	0.042*

*Significant at 95% level

Table II: Percentage of graft take after 2 days of dressing removal (Group A day 5 and Group B day 7) of the study cases in group A and group B (n=96)

Variables	Group A (Day 5)	Group B (Day 7)	P value
Percentage of graft take after 2 days of dressing removal (Group A day 5 and Group B day 7)	99.31 (± 0.27)	96.16 (± 0.79)	0.036*

*Significant at 95% level

Table III: Percentage of graft take at 14th post-operative day of the population in group A and group B (n=96)

Variables	Group A (Day 3)	Group B (Day 5)	P value
Percentage of graft take at 14th post-operative	97.02 (± 0.72)	95.23 (± 0.53)	0.022*

*Significant at 9

Table IV: Seroma formation after dressing removal among the study cases in group A and group B (n=96)

Seroma	Group A (Day 3) n (%)	Group B (Day 5) n (%)	Total	P value
Present	7 (7.3)	9 (9.4)	16 (16.7)	0.584*
Absent	41 (42.7)	39 (40.6)	80 (83.3)	
Total	48 (50)	48 (50)	96 (100)	

*Significant at 95% level

Table V: Hematoma formation after dressing removal among the participants in group A and group B (n=96)

Hematoma	Group A (Day 3) n (%)	Group B (Day 5) n (%)	Total	P value
Present	4 (4.2)	5 (5.2)	9 (9.4)	0.726*
Absent	44 (45.8)	43 (44.8)	87 (90.6)	
Total	48 (50)	48 (50)	96 (100)	

*Significant at 95% level

Table VI: Comparing infection rate in group A and group B postoperatively, through clinical evidence of infection and positive culture and sensitivity (n=12)

Groups	Clinical evidence of infection and positive culture and sensitivity	P value
A	4 (4.2)	0.178*
B	8 (8.3)	

*Significant at 95% level

Table I shows, In group A, the mean percentage of graft take was notably high, measuring 99.57% (± 0.19). In contrast, in group B, exhibited a slightly lower mean percentage of graft uptake, measuring 97.05% (± 0.69). The observed difference in graft uptake between the two groups was statistically significant ($P=0.042$ which is <0.05).

The mean percentage of graft take after 2 days of dressing removal in group A was 99.31% (± 0.27). Whereas in group B, it was 96.16% (± 0.79). Here, the difference between the two groups was statistically significant ($P < 0.05$) showed in table 2.

The mean percentage of graft take at 14th POD in group A was 97.02% (± 0.72). While in group B, measuring 95.23% (± 0.53). There was statistically significant association ($P < 0.05$) between 2 groups (Table 3).

Table 4 shows, in group A, 14.6% participants presented with seroma formation. Similarly in group B, 18.8% exhibited seroma formation. In group A, 8.3% exhibited hematoma formation while in group B, 10.4% presented with hematoma. 8.3% participants exhibited clinical evidence of infection which in group B, it was slightly higher incidence, 16.7%.

Discussion

The primary aim was to assess and compare the outcomes of Split Thickness Skin Grafts (STSG) between dressing removal on the 3rd day versus the 5th day. The study's findings were meticulously scrutinized and juxtaposed with relevant data from previously published studies in the field, contributing to the growing body of knowledge in plastic surgery.

Ninety-six cases, encompassing a diverse range of etiologies, were included in the study, offering a comprehensive perspective on graft take and its correlation with postoperative dressing practices. The patient cohort was thoughtfully divided into two groups: Group A, consists of 48 patients who underwent postoperative dressing removal on the 3rd day, and Group B, comprising 48 patients with dressing removal scheduled on the 5th day.

The demographic distribution disclosed stimulating insights. In Group A, 37.5% of patients belonged to the age range of 25-34 years, while in Group B, 33.33% were in the age groups of 25-34 years and 35-44 years. The mean age across both groups was 32.30 ± 10.26 years, crossing a broad age spectrum from 10 to 60 years.

In Group A, consisting of 48 individuals, there were 38 males (79.17%) and 10 females (20.83%), while Group B, with an equal number of participants, showed 32 males (66.67%) and 16 females (33.33%). The combined dataset for both groups (Total N = 96) indicated a male predominance, with 70 individuals (72.92%) being male and 26 individuals (27.08%) being female. Interestingly, the study noted that the majority of participants in both groups did not have comorbidities, with 83.3% of cases showing no comorbidities, while 14.6% had Diabetes and 2.1% had Hypertension. Reddy S et al. highlighted a higher rate of graft failure in diabetic patients in their study, emphasizing the importance of considering underlying health conditions in graft outcomes.⁷ The analysis of recipient sites for the skin graft revealed that the lower limb was the most common site (58.35%), followed by the trunk (18.8%), upper limb (15.6%), and a notable presence on the scalp (8.3%). Shah S. A. et al.'s study also noted a higher failure rate for STSG on the lower limb compared to other body

parts, underlining the significance of considering graft location in the overall success of the procedure.⁸

In Group A, where dressing removal occurred on Day 3 postoperatively, the mean percentage of graft take was 99.57% (± 0.19), while in Group B, with dressing removal on Day 5, exhibited a slightly lower mean percentage of graft take at 97.05% (± 0.69). This difference was statistically significant ($P = 0.042$), suggesting that early dressing removal on Day 3 may be associated with higher initial graft take. Yalagachin et al. reported mean graft take values of 88.48% for Day 3 and 82.62% for Day 5 dressing removal in their study, highlighting the consistency of the current findings with prior research.⁵

After 2 days of dressing removal, Group A demonstrated a mean graft take of 99.31% (± 0.27), while Group B, with dressing removal on Day 5, exhibited a slightly lower mean graft take of 96.16% (± 0.79). The observed difference was statistically significant ($P = 0.036$), emphasizing the continued superiority of early dressing removal on Day 3. Yalagachin et al. reported mean graft take values of 88.14% for Day 3 and 78.02% for Day 5 dressing removal, corroborating the current study's emphasis on the importance of early postoperative care.⁵

The study further analyzed graft uptake on the 14th postoperative day, revealing a mean graft take of 97.02% (± 0.72) in Group A and 95.23% (± 0.53) in Group B. The observed difference was statistically significant ($P = 0.022$), underscoring the sustained advantage of Day 3 dressing removal. Shah S A et al. observed a 94% graft take rate on the 14th postoperative day with dressing removal after 5 days.

Regarding complications, in both Group A and Group B, the majority reported the absence of seromas (85.4% and 81.2%, respectively) and hematomas (91.7% and 89.6%, respectively). The observed differences were not statistically significant, providing reassurance regarding the overall safety of the postoperative protocols. Shah et al. found that 8.9% of graft failure cases in their study were associated with hematoma formation after 5 days of dressing removal, emphasizing the importance of vigilant postoperative care.

When evaluating infection rates, Group A showed clinical evidence of infection in 8.3% of participants, while Group B had a slightly higher incidence at 16.7%. The variation in infection rates between the two groups was not statistically significant, warranting further investigation into potential contributing factors. Yalagachin G et al. reported positive culture rates of 45% for Day 3 and 50% for Day 5 dressing removal, indicating the need for continued attention to infection prevention measures.⁵ Nsaful K. O. et al. noted a graft loss rate of 20.8% due to bacterial infection, underscoring the significance of infection control in graft outcomes.⁹ Ahmadi A et al. also emphasized the importance of early skin graft changes in reducing infection rates in burn patients, highlighting the broader implications of this study's findings for postoperative care protocols in related surgical procedures.¹⁰

In conclusion, this comprehensive study not only contributes valuable insights into the outcomes of Split Thickness Skin Grafts but also establishes a robust foundation for future research in the field of plastic surgery. The meticulous examination of demographic factors, graft outcomes, and postoperative complications provides a nuanced understanding of the complexities involved in optimizing patient care in the context of STSG procedures. The alignment of these findings with existing literature reinforces the validity and generalizability of the study's outcomes, emphasizing the potential for improved clinical practices and patient outcomes in the premises of plastic surgery.

Conclusions

This study observed that, if the postoperative dressing was removed at 3rd day, this helped in evacuation of hematoma, seroma. Early evacuation of Seroma and hematoma restores vascular perfusion. So that, skin graft can be salvaged & graft take can be increased by early postoperative dressing removal at day 3. Infection is one of the cause of graft loss and it is early detected in case of early removal of dressing. Percentage of graft take is more in case of early removal of dressing on 3rd POD.

Conflict of interests: None

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Original Article

Effect of *Nigella Sativa* (Kalo Jira) on Lipid Profile of Dyslipidemic Postmenopausal Women

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Abstract

Background: The risk of cardiovascular disease (CVD) significantly increases in postmenopausal women, making CVD the leading cause of morbidity and mortality in women over 50 years of age. Menopause is a key risk factor for CVD, and dyslipidemia is one of the major contributors. *Nigella sativa* (Kalo Jira), a traditional medicinal herb, has recently gained attention for its potential in managing dyslipidemia.

Objective: Hence, this study aimed to assess the impact of *N. sativa* on the lipid profile of postmenopausal women with dyslipidemia.

Methods: For this interventional study, forty dyslipidemic postmenopausal women aged 50 to 63 years were recruited based on inclusion and exclusion criteria using purposive consecutive sampling. Participants were drawn from the gynecology and obstetrics and medicine outpatient departments of Sir Salimullah Medical College and Mitford Hospital, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, and through personal contacts in various areas of Dhaka city. Each participant received a 500 mg *N. sativa* capsule twice daily after meals for a duration of 90 days. Lipid profiles, including total cholesterol (TC), low-density lipoprotein (LDL-C), high-density lipoprotein (HDL-C), triglycerides (TG), as well as fasting blood glucose (FBG), serum creatinine, and serum ALT, were measured before the intervention (Day 1, Phase A) and after 90 days (Day 91, Phase B) using standard laboratory methods. Statistical analysis was performed using paired t-tests via SPSS (version 22).

Results: After 90 days of supplementation with *N. sativa*, there was a significant reduction in mean total cholesterol (TC), triglycerides (TG), and low-density lipoprotein cholesterol (LDL-C) ($p < 0.001$). In contrast, high-density lipoprotein cholesterol (HDL-C) levels increased significantly ($p < 0.001$) compared to baseline measurements.

Conclusion: Regular consumption of *N. sativa* significantly improves the lipid profile in dyslipidemic postmenopausal women, suggesting its potential role in the management of dyslipidemia and the reduction of cardiovascular risk.

Keywords: Menopause, dyslipidemia, cardiovascular disease, *Nigella sativa*, lipid profile.

Introduction

Menopause, defined as the permanent cessation of menstruation, typically occurs around the age of 51¹⁶. It is marked by a decline in ovarian hormones, leading to symptoms such as hot flashes, mood swings, reduced libido, and insomnia¹². This phase also increases the risk of metabolic

and cardiovascular changes, notably a decrease in estrogen, which negatively impacts lipid profiles by lowering HDL and elevating LDL, total cholesterol (TC), and triglycerides (TG), significantly raising cardiovascular disease (CVD) risk^{6,14}.

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Estrogen protects younger women from conditions like ischemic heart disease, osteoporosis, and thromboembolism, but this protection diminishes post-menopause, leading to a rise in CVD risk factors such as dyslipidemia, hypertension, and obesity^{26, 29}. Studies show a higher incidence of coronary artery disease and other CVDs in postmenopausal women compared to their premenopausal counterparts³⁰.

CVD remains the leading cause of death worldwide, affecting both men and women, but its prevalence significantly increases after menopause due to estrogen deprivation^{18, 27}. Managing cholesterol levels is crucial for preventing CVD, and natural remedies are gaining attention as alternatives to synthetic drugs⁷.

N. sativa (Kalo Jira), commonly used in traditional medicine, has been studied for its diverse health benefits, including its lipid-lowering, anti-inflammatory, antioxidant, and antihypertensive properties^{5, 24}. The seeds are rich in bioactive compounds like thymoquinone, proteins, vitamins, and polyunsaturated fatty acids, which contribute to its therapeutic potential¹. Although some small studies have explored the hypolipidemic effects of *N. sativa*²³, data on its impact in Bangladeshi postmenopausal women remain limited.

Thus, this study aims to evaluate the effect of *N. sativa* on the lipid profile of dyslipidemic postmenopausal women in Bangladesh.

Methodology

Study Settings and Population: This interventional study was carried out in the Department of Physiology at Sir Salimullah Medical College and Mitford Hospital, Dhaka, Bangladesh, over the course of one year, from January to December 2021. A total of forty (40) dyslipidemic postmenopausal women, aged 50 to 63 years, were recruited using a consecutive purposive sampling technique.

Grouping of the subjects: The study involved a cohort of forty (40) dyslipidemic postmenopausal women, aged 50 to 63 years, who were assessed at two distinct phases. In Phase A, which served as the comparison group, participants were evaluated prior to the initiation of *N. sativa* consumption (baseline, day 1). In Phase B, designated as the study group, the same participants were re-evaluated

after completing a 90-day course of *N. sativa* supplementation (day 91). This two-phase design allowed for a direct comparison of lipid profile changes following the intervention.

Selection Criteria: The study included dyslipidemic postmenopausal women aged 50 to 65 years with a normal BMI (18.5–24.9 kg/m²), who were at least three years post-menopause and had borderline high levels of LDL-C, total cholesterol, and triglycerides. Exclusion criteria encompassed those with co-morbidities such as diabetes, hypertension, thyroid disorders, renal or cardiovascular disease, cancer, liver disorders, stroke, abnormal menopause, and a history of smoking, addiction, or alcoholism. Additionally, participants who regularly consumed *N. sativa* or used lipid-lowering medications, as well as those with severe dyslipidemia, were excluded.

Study Procedure: A total of forty (40) newly diagnosed dyslipidemic postmenopausal women with borderline high lipid levels were selected according to established inclusion and exclusion criteria. Participants were recruited from the gynecology, obstetrics, and medicine outpatient departments of Sir Salimullah Medical College (SSMC) and Mitford Hospital, as well as through personal contacts in Dhaka city. Comprehensive counseling was provided, detailing the study's objectives, risks, benefits, and procedures to encourage voluntary participation. Informed written consent was obtained, and participants were made aware of their right to withdraw at any time. Ethical approval was granted by the Institutional Ethics Committee (IEC) of SSMC and Mitford Hospital.

Prior to blood collection, a standardized questionnaire was used to gather detailed personal, family, medical, menopausal, and occupational histories, followed by a thorough physical examination. Fasting blood samples were collected for biochemical analysis, measuring total cholesterol (TC), triglycerides (TG), low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), fasting blood glucose (FBG), serum creatinine, and serum alanine transaminase (ALT) levels at the Department of Biochemistry and Molecular Biology, Bangabandhu Sheikh Mujib Medical University (BSMMU). Only participants meeting the study criteria were included.

Each *N. sativa* (Kalo jira) capsule, prepared by the Science Laboratory Institution, Dhaka, contained 500 mg. Participants were instructed to take one capsule twice daily after meals for 90 days while maintaining their usual diet and physical activity. Regular follow-ups were conducted through telephone and in-person visits to ensure compliance and provide additional capsules as needed.

At the conclusion of the 90-day intervention, a second blood sample (5 mL) was collected from all participants to assess changes in serum TC, TG, LDL-C, and HDL-C levels at the BSMMU, facilitating the evaluation of the lipid profile following *N. sativa* consumption.

Statistical Analysis: Data are presented as mean $\pm$ standard deviation (SD). Statistical analysis were performed using the Statistical Package for the Social Sciences (SPSS) for Windows version 22. A paired sample t-test was employed to assess the significance of differences between pre- and post-intervention measurements. A p-value of ≤ 0.05 was considered statistically significant.

Ethical Approval: The study protocol received approval from the Institutional Ethics Committee (IEC) of Sir Salimullah Medical College (SSMC), Dhaka, Bangladesh.

Result

The mean ($\pm$ SD) age of subjects were 55.05 ± 3.41 years in both phases and the mean ($\pm$ SD) BMI of the subjects were 23.80 ± 0.81 and 22.53 ± 1.03 kg/m² in phase A and phase B respectively. BMI of all subjects in phase A were within reference range. In this study, the mean ($\pm$ SD) BMI were significantly ($p < 0.001$) decreased in phase B than that of phase A (Table I).

Table I: Mean age and body mass index (BMI) of the study subjects in both phases (N=40)

Variables	Phase A	Phase B	p-value
Age (years)	55.05 ± 3.41 (50.00-63.00)	55.05 ± 3.41 (50.00-63.00)	
BMI (kg/m ²)	23.80 ± 0.81 (20.30-24.60)	22.53 ± 1.03 (20.10 - 24.80)	$<0.001^{***}$

Data are expressed as mean $\pm$ SD. Paired 't' test was performed to compare between phases. p-value ≤ 0.05 was accepted as level of significance. Figures in parentheses indicate ranges. Phase A: Before *N. sativa* consumption (day 1); Phase B: After *N. sativa* consumption (day 91); N= Total number of study subjects; ***=significant at $p < 0.001$.

In Phase A of the study, the mean fasting blood glucose (FBG) level was found to be 5.53 ± 0.31 mmol/L, indicating that all participants fell within the normal reference range and were classified as non-diabetic. Additionally, the mean serum alanine transaminase (ALT) level was recorded at 23.53 ± 4.00 U/L, also within the normal range, suggesting that all subjects exhibited normal liver function. Furthermore, the mean serum creatinine level was 0.85 ± 0.06 mg/dL, which remained within the established normal limits, confirming that all participants had normal renal function (Table II).

Table II: Mean FBG, ALT and serum creatinine of the study subjects in phase A (N=40)

Variables	Phase A
FBG (mmol/L)	5.53 ± 0.31 (4.90 - 6.00)
ALT (U/L)	23.53 ± 4.00 (15.00 - 31.00)
Serum creatinine (mg/dl)	0.85 ± 0.06 (0.75 - 1.10)

Data are expressed as mean $\pm$ SD. Figure in parentheses indicate ranges.

Table III: Mean pulse rate and blood pressure of the study subjects in both phases (N=40)

Variables	Phase A	Phase B	p-value
Pulse rate (beats/min)	79.60 ± 5.98 (72.00 - 94.00)	74.35 ± 5.92 (60.00 - 88.00)	$<0.001^{***}$
Systolic blood pressure (mm of Hg)	126.88 ± 6.57 (110.00 - 135.00)	119.25 ± 7.21 (100.00 - 135.00)	$<0.001^{***}$
Diastolic blood pressure (mm of Hg)	75.13 ± 7.64 (60.00 - 85.00)	69.63 ± 7.02 (60.00 - 85.00)	$<0.001^{***}$

In Phase A, the participants exhibited a mean pulse rate of 79.60 ± 5.98 beats per minute, which decreased to 74.35 ± 5.92 beats per minute in Phase B, with both measurements remaining within the normal reference range (Table III). The mean systolic blood pressure (SBP) was 126.88 ± 6.57 mm Hg in Phase A, significantly lowering to 119.25 ± 7.21 mm Hg in Phase B ($p < 0.001$), indicating a notable reduction while still within the normal limits. Similarly, the mean diastolic blood pressure (DBP) decreased significantly from 75.13 ± 7.64 mm Hg in Phase A to 69.63 ± 7.02 mm Hg in Phase B ($p < 0.001$), confirming that all subjects remained normotensive throughout both phases (Table III & Figure 1).

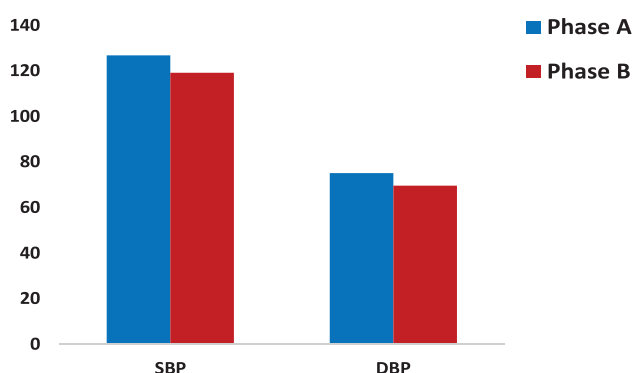


Figure 1: Mean blood pressure of the study subjects in both phases (N=40)

The lipid profiles of all subjects were evaluated by measuring serum levels of total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), and triglycerides (TG). The mean ($\pm$ SD) TC levels significantly decreased from 241.53 ± 19.29 mg/dl in phase A to 180.80 ± 21.63 mg/dl in phase B (Figure 2), indicating a substantial improvement in lipid metabolism

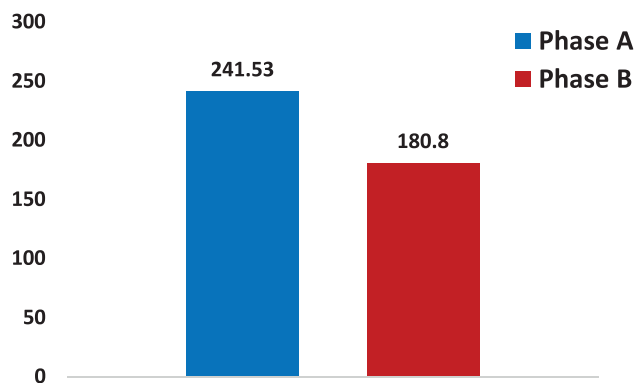


Figure 2: Mean serum total cholesterol (TC) of the study subjects in both phases (N=40)

The mean ($\pm$ SD) levels of HDL were recorded as 39.73 ± 5.51 mg/dl in phase A and significantly increased to 44.53 ± 6.18 mg/dl in phase B (Figure 3).

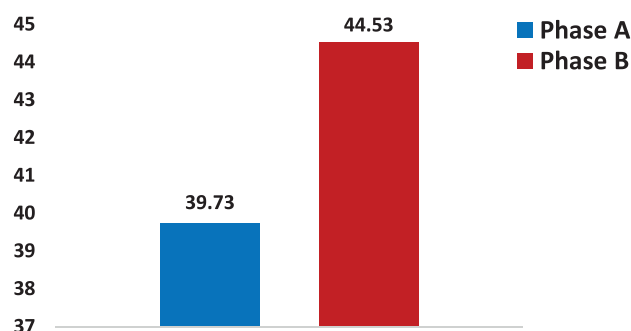


Figure 3: Mean serum high density lipoprotein cholesterol (HDL-C) of the study subjects in both phases (N=40)

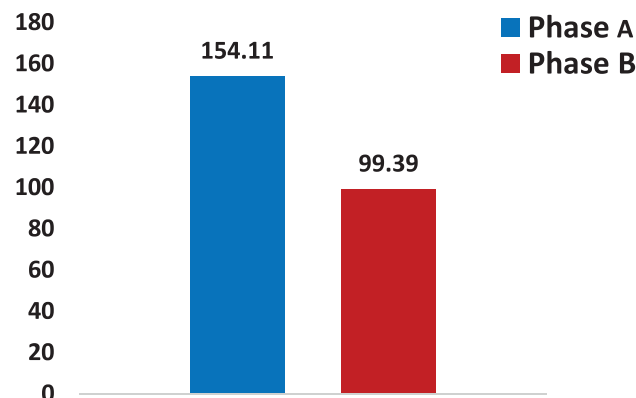


Figure 4: Mean serum low density lipoprotein cholesterol (LDL-C) of the study subjects in both phases (N=40)

The mean ($\pm$ SD) TG levels were 242.79 ± 41.08 and 189.11 ± 36.52 mg/dl in phase A and phase B respectively (Figure 5).

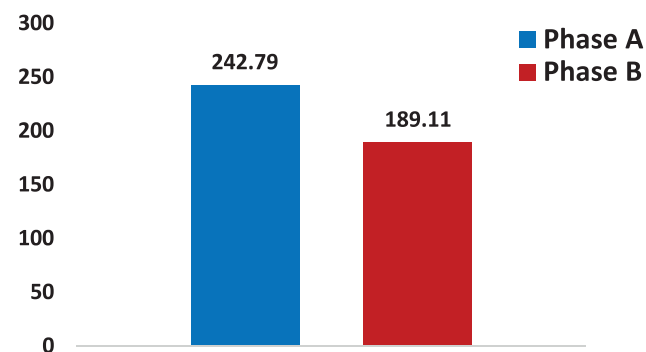


Figure 5: Mean serum triglyceride (TG) of the study subjects in both phases (N=40)

A significant reduction in total cholesterol (TC) levels is observed in phase B compared to phase A ($p < 0.001$), indicating an improvement in lipid profiles. Conversely, high-density lipoprotein cholesterol (HDL-C) levels significantly increased in phase B ($p < 0.001$), reflecting a favorable shift in cardiovascular health. However, HDL-C levels also significantly decreased in phase B compared to phase A ($p < 0.001$), necessitating further investigation. Additionally, triglyceride (TG) levels showed a significant decrease in phase B relative to phase A ($p < 0.001$), reinforcing the positive effects on lipid metabolism (Table IV).

Table IV: Mean lipid profile of the study subjects in both phases (N=40)

Lipid profile	Phase A	Phase B	p-value
TC (mg/dl)	241.53 $\pm$ 19.29 (205.00 - 286.00)	180.80 $\pm$ 21.63 (130.00 - 232.00)	<0.001***
HDL-C (mg/dl)	39.73 $\pm$ 5.51 (30.00 - 53.00)	44.53 $\pm$ 6.18 (35.00 - 57.00)	<0.001***
LDL-C (mg/dl)	154.11 $\pm$ 14.73 (131.00 - 187.00)	99.39 $\pm$ 18.43 (72.00 - 156.00)	<0.001***
TG (mg/dl)	242.79 $\pm$ 41.08 (180.00 - 318.00)	189.11 $\pm$ 36.52 (97.00 - 271.00)	<0.001***

Data are expressed as mean $\pm$ SD. For statistical analysis paired t test was performed for comparison. p -value ≤ 0.05 was accepted as level of significance. Figure in parentheses indicate ranges. Phase A: Before Nigella sativa consumption (day 1); Phase B: After Nigella sativa consumption (day 91); N= Total number of study subjects

Discussion

This study aimed to evaluate the effects of oral *N. sativa* consumption on lipid profiles in dyslipidemic postmenopausal women. Baseline assessments revealed that serum levels of total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), and triglycerides (TG) were consistently above normal reference ranges. These findings reflect a significant public health concern in this demographic, corroborating similar observations by researchers in various countries^{13, 15, 25}.

Total cholesterol (TC) level: The mean TC level significantly decreased ($p < 0.001$) following 90 days of *N. sativa* consumption, consistent with reports from multiple studies^{11, 13, 19, 20}. However, some reductions were noted which were not statistically significant^{4,5,8}, while²⁸ observed an increase in TC levels post-consumption that also lacked statistical significance. The latter authors suggested that the shorter intervention period (8 weeks) might have influenced these outcomes, implying that longer consumption durations may yield different results.

High-density lipoprotein cholesterol (HDL-C): The present study found a significant increase ($p < 0.001$) after 90 days of *N. sativa* intake. This is consistent with other studies^{13, 20}. Nonetheless, it was reported an increase in HDL-C that was not statistically significant [10], while other researchers documented significant decreases, attributing these discrepancies to shorter study durations and lower dosages^{21,23}. Further,⁹ observed significant HDL-C increases in Hashimoto's thyroiditis patients post-*N. sativa* consumption, while^{3,4} demonstrated a significant rise in HDL-C levels in hypercholesterolemic subjects. These contrasting results underscore the need for more comprehensive investigations into the effects of *N. sativa* across different populations and dosing strategies.

Low-density lipoprotein cholesterol (LDL-C): In this study, the mean LDL-C level significantly decreased ($p < 0.001$) after 90 days of *N. sativa* supplementation, aligning with findings from various studies^{11,13,25}. Conversely,⁸ and¹⁷ reported decreases that were not statistically significant, and²⁸ noted an increase in LDL-C that also lacked significance. In contrast,¹⁰ and¹⁵ found significant reductions in LDL-C levels in dyslipidemic and perimenopausal women with metabolic syndrome, respectively.²² similarly observed significant decreases among obese and overweight women following *N. sativa* consumption. These variations may be attributed to the antioxidant properties of *N. sativa*, which potentially enhance liver efficiency in clearing LDL-C from the bloodstream by increasing LDL receptor densities and promoting binding to apolipoprotein B.

Triglyceride (TG): TG level in dyslipidemic postmenopausal women significantly decreased ($p < 0.001$) after 90 days of *N. sativa* intake, consistent with previous studies [13, 19, 25]. In contrast, [21] reported increased TG levels following *N. sativa* consumption, attributing this to a shorter duration of 4 weeks. However, significant reductions in TG levels among hypercholesterolemic patients and subjects were noted respectively [2, 3]. Collectively, these findings suggest that *N. sativa* may effectively improve lipid profiles, particularly concerning TG levels, in specific populations.

In the current study, the observed hypocholesterolemic effects of *N. sativa* may be attributed to multiple mechanisms, including the downregulation of HMG-CoA reductase activity, upregulation of the LDL receptor (LDLR) gene, increased production of apolipoproteins A-I and A-II in the liver, enhanced triglyceride catabolism, and elevated biliary cholesterol excretion. However, these underlying mechanisms warrant further investigation to elucidate their precise contributions to the lipid-modulating effects of *N. sativa*.

Conclusion

In conclusion, the findings of this study demonstrate that regular consumption of *N. sativa* effectively lowers total cholesterol, low-density lipoprotein cholesterol (LDL-C), and triglyceride levels while significantly elevating high-density lipoprotein cholesterol (HDL-C) in dyslipidemic postmenopausal women. These results underscore the potential of *N. sativa* as a valuable dietary intervention for improving lipid profiles in this demographic, suggesting its role in mitigating cardiovascular risk associated with dyslipidemia.

Conflict of interests: Not declared.

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Original Article

Comparative Analysis of Phonophoresis and Conventional Ultrasound Therapy in de Quervain's Tenosynovitis: A Randomized Control Trial

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Abstract

Background: One of the common causes of wrist and hand pain is de Quervain's tenosynovitis, which is defined as an entrapment of the extensor pollicis brevis and abductor pollicis longus tendons in the first dorsal compartment of the wrist. There are pharmacological and non-pharmacological methods of treating the illness. Non-pharmacological treatments include immobilization, electrical nerve stimulation, heat and cold therapy, thumb stabilizer splints, workplace posture correction, and tool and equipment adjustments. The purpose of this randomized clinical experiment was to determine how phonophoresis affected the patients with de Quervain's tenosynovitis.

Methods: This randomized clinical trial was conducted in the Department of Physical Medicine and Rehabilitation, Khulna Specialized Hospital, Khulna, Bangladesh and Physical Medicine Center, Khulna, Bangladesh over a period of six months. Group A-experimental or interventional group and group B-control group by randomization with the help of lottery. Experimental group was managed by activities of daily living (ADLs) instructions, Phonophoresis (with non-steroidal anti-inflammatory agents NSAIDs gel), along with thumb spica splint. Control group B received previous management except non-steroidal anti-inflammatory agents (NSAIDs gel). All patients received therapeutic ultrasound in a same dosage (1 watt/cm²/min) for 8 minutes. An evaluation was made at initial visit and two weeks interval for 6 weeks. So, there were three follow up visits and these evaluations were performed by the same investigator. In each visit, measurement of pain intensity and disability level were performed by using visual analogue scale (VAS), Tenderness Index and Patient rated wrist evaluation (PRWE) respectively. All results were recorded systematically. A post intervention result was compared with baseline result by SPSS-20.

Results: Out of 40 total patients 40(100%) had Finkelstein test positive. Significant difference between Group A and Group B was found at week 4 and Week 6 follow up ($P<0.05$) whereas other early follow up was non-significant in VAS analysis ($p>0.05$). Significant difference between Group A and Group B was found at week 4 and week 6 follow up ($P<0.05$) regarding change of tenderness and PRWE.

Conclusion: Regarding treatment of de Quervain's tenosynovitis, present study shown that Phonophoresis reduces the morbidity and relief of pain of patients in comparison to other conventional treatment.

Keywords: de Quervain's tenosynovitis, Phonophoresis, thumb spica splint

Introduction

Phonophoresis is a method of driving topically applied substances across tissues using ultrasound (US) to enhance percutaneous absorption of selected drugs such as NSAIDs, corticosteroids and local anaesthetics.¹ Tenosynovitis is inflammation of a tendon and its enveloping

synovial sheath.² Stenosing tenosynovitis or de Quervain's tenosynovitis is classically defined as a stenosing tenosynovitis of the synovial sheath of tendons of the abductor pollicis longus and extensor pollicis brevis muscles in the first compartment of the wrist due to repetitive use.³

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These musculotendinous units control the position and orientation, force application and joint stability of the thumb. The impaired gliding is believed to be as a result of thickening of the extensor retinaculum at the first dorsal (extensor) compartment of the wrist, with subsequent narrowing at the fibro-osseous canal.⁴ Extensor triggering, which is manifested by locking in extension, is rare but has also been reported in de Quervain's tenosynovitis with a prevalence of 1.3%.⁵ Overexertion related to household chores and recreational activities including piano playing, sewing, knitting, typing, bowling, golfing, and fly-fishing have been reported to cause de Quervain's tenosynovitis. Workers involved with fast repetitive manipulations such as pinching, grasping, pulling, and pushing are also at risk.⁶ Excessive use of the text messaging feature on a cellular phone has now also been linked to this painful condition.⁷ Presenting symptoms are pain and swelling at the base of the thumb having positive Finkelstein test.⁸

Patients having diabetes, RA and pregnant women are more prone to develop de Quervain's disease.^{9,10} There is no predilection for right versus left side, and no racial differences have been observed.¹¹ The goal of treatment for de Quervain's tenosynovitis is to relieve the pain and swelling and restore normal function. Activity modification is often the most important consideration in conservative management.¹²

Materials and Methods

Patient with wrist pain attending the Out-patient department of Physical Medicine & Rehabilitation of Khulna Specialized Hospital, Khulna, Bangladesh and Physical Medicine Center, Khulna, Bangladesh, over a period of six months. 40 Patients with de Quervain's tenosynovitis were selected from the 01 January 2022 to 30 June 2022. Patients were allocated into two groups group A or group B by lottery. All data was recorded systematically in a semi-structured questionnaire. Group-A - Phonophoresis + ADLs + Thumb spica splint. Group-B UST + ADLs + Thumb spica splint. Equipments used for outcome were Data collection sheet, VAS, Tenderness Index, PRWE questionnaire. A thorough history was taken from the registered patients and clinical examination of the patients were done which include general examination, musculoskeletal and neurological examination of upper limbs, examination of cervical region and wrist joint to find out

the cause of wrist pain. Past history of illness and any systemic diseases were inquired cautiously. Patient who met exclusion criteria were excluded. All symptoms and signs of each participant were recorded accordingly and clinical diagnosis was made. Relevant investigation was done. Thus diagnosis of de Quervain's tenosynovitis was confirmed clinically after exclusion of other possible diagnosis by related investigation. Pre intervention and post intervention pain score & tenderness were evaluated by visual analogue scale (VAS) and Tenderness index (TI) respectively. Similarly functional status was assessed by using Patient rated wrist evaluation (PRWE) questionnaire. At first PRWE questionnaire was translated into Bangla to make it easily understand to participants. The questionnaire was finalized following pretesting. The post intervention responses were recorded at 2 weekly intervals for six weeks following initiation of treatment. All data were recorded systematically in the data sheet.

Thumb spica splint:



Fig: Thumb spica splint

Ultrasound therapy machine:



Fig: Ultrasound therapy machine



Fig: Patient receiving UST without NSAID and Phonophoresis (UST with NSAID gel)

Result

40 patients were selected for this study. They were randomly divided into 2 groups.

Table-I: Gender distribution of study patients

Gender	Group		Total	
	Group A (n=20)	Group B (n=20)	(n=40)	No. (%)
Male	4	3	7	17.5
Female	16	17	33	82.5
Total	20	20	40	

There were 33 female (82.5%) and 7 male (17.5%) in the study and female male ratio was 2.75:1.

Table-II: Distribution Involved Wrist

Involved Wrist	Group		Total	
	Group A (n=20)	Group B (n=20)	(n=40)	No.(%)
Right	16	18	34	85
Left	2	1	3	7.5
Both	2	1	3	7.5
Total	20	20	40	100

Involvement of wrists was more in the right 34 (85%), in Group-A 16 (40%) and in Group-B 18 (45%). Whereas left wrist and both wrist involvement were less, only 3 (7.5%)

Table-III: Aggravating Factors

Aggravating Factors	Group		Total	
	Group A (n=20)	Group B (n=20)	(n=40)	No.(%)
Wringing of cloth	5	4	9	22.5
Lifting of heavy objects	4	4	8	20
Repetitive grasping	11	10	21	52.5
Diabetes Mellitus	0	1	1	2.5
Pregnancy	0	1	1	2.5
Total	20	20	40	100

de Quervain's tenosynovitis was more found in female who had a precipitating factor as repetitive grasping 21(52.5%), some developed this condition due to lifting heavy objects such as baby 8 (20%) and wringing of cloth 9 (22.5%). Diabetes mellitus 1 (2.5%) and pregnancy 1 (2.5%) also precipitated the condition.

Analysis of VAS at different follow up data in both group: Significant difference between Group A and Group B was found at week 4 and Week 6 follow up ($P<0.05$).

Table-IV: Pain analysis by VAS

Pain on VAS		Group		Total		p- value
		Group A (n=20)	Group B (n=20)	(n=40)	No. (%)	
During enrollment	Mild pain	1	2	3	7.5	40(100%)
	Moderate pain	17	17	34	85	
	Severe pain	2	1	3	7.5	
After Week 2	Mild pain	1	2	3	7.5	40(100%) 0.500
	Moderate pain	19	18	37	92.5	
After Week 4	Mild pain	17	4	21	52.5	40(100%) 0.000
	Moderate pain	3	16	19	47.5	
After Week 6	No pain	17	5	22	55	40(100%) 0.000
	Mild pain	3	15	18	45	

After Week 6, mild pain in group-A 3(15%) and group-B 15 (75%) and No pain Group-A 17(85%) and Group-B 5(25%). Between the two study groups showed significant variation (Table-IV). Post- treatment pain score showed significant improvement ($P<0.01$) in Group-A patients compared to group-

B. After week 6, Gr-I tenderness in group-A 20 (100%) and group-B 20 (100%). Between the two study

group showed significant variation. Post-treatment tenderness index showed significant improvement ($P<0.01$) in Group-A patients compared to group-B.

Analysis of patient rated wrist evaluation (PRWE) at different follow up data in both group: Significant differ-

ence between Group A and Group B was found at week 4 and week 6 of follow up ($P>0.05$) regarding PRWE.

Table-V: PRWE evaluation

Patient Rated Wrist Evaluation (PRWE)		Group		Total	No.	P value
		Group A	Group B	(n=40)	(%)	
		(n=20)	(n=20)			
During enrollment	Mild pain	4	5	9	22.5	0.374
	Moderate pain	16	15	31	77.5	
	Total	20	20	40	100	
After Week 2	Mild pain	4	5	9	22.5	
	Moderate pain	16	15	31	77.5	
	Total	20	20	40	100	
After Week 4	Mild pain	20	20	40	100	0.000
	Total	20	20	40	100	
After Week 6	Pain free	15	4	19	47.5	0.000
	Mild pain	5	16	21	52.5	
	Total	20	20	40	100	

During enrollment in both groups most patients had moderate pain in group-A 16 (80%) and group-B 15 (75%). After week-4, mild pain in group-A 20 (100%) and group-B 20 (100%). After week 6, Pain free in group-A 15

(75%) and group-B 4 (20%). Between the two study group showed significant variation (Table-8). Post-treatment tenderness index showed significant improvement ($P<0.01$) in group-A Patients compared to group B

Table-VI: Final outcome of treatment in the study patients

Outcome	Group A (n=20)	Group B (n=20)	Total (n=40)	No.(%)	P value
Completely cured	15	4	19	47.5	0.000
Moderate/Mild reduction of symptoms	5	16	21	52.5	
Total	20	20	40	100	

Table-9 shows final result of treatment in the two groups of patients. In group A, 15(75%) and in group B, 4(20%) patients were completely cured (no pain, no tenderness, no swelling) and moderate/mild reduction of symptoms in Group A was 5 (25%) and in Group B was in 16(80%). The cure rate showed statistically significant improvement in Group-A.

Discussion

In the present study gender in both groups male and female were matched and female to male ratio was 2.75:1. Female

33 (82.5%) were more affected than male 7 (17.5%). Socioeconomic status was found different in both groups where poor was 2(5%), middle class was 36(90%) and rich was 2(5%). In the present study regarding wrist involvement right wrist were involved more in Group-B 18(90%) than Group-A 16(80%). There were some patients who had both wrist involvements (7.5%). All patients in both groups had some aggravating factor but relieving factors were less. It has been reported that 8.3% of patients present with upper extremity

conditions as their chief complaint in chiropractic practices. 13, 14 de Quervain's tenosynovitis has also been shown to usually present in the fifth and sixth decades of life, as well as being more common in pregnant and lactating women. The medication included non-steroidal anti-inflammatory Drugs (NSAIDs) and analgesic, an injection of a steroid mixed with xylocaine into tendon sheaths. Decompression of the first dorsal compartment demonstrated a good result, but surgery is rarely made except if the patient does not respond well to that treatments¹⁵. The positive outcome was a complete resolution of the patient's complaint. Significant difference between Group A and Group B was found at week 4 and Week 6 follow up ($P < 0.05$) where as other early follow was non-significant in VAS analysis ($p > 0.05$). Significant difference between Group A and Group B was found at week 4 and week 6 follow up ($P < 0.05$) regarding change of tender index in Group A than Group B. Significant difference between Group A and Group B was found at week 4 and week 6 of follow up ($P > 0.05$) regarding PRWE. So it can be said that group-A patients who were treated along with UST+N-NSAIDs had better outcome in reduction of pain and day to day activity.

Conclusion

Phonophoresis is a promising treatment for de Quervain's tenosynovitis than other conventional treatments. It is safe and provides symptomatic and functional relief of the condition.

Conflict of interests: All contributing authors declare no conflicts of interest.

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Original Article

Association of Serum C-Reactive Protein Levels with Psoriasis

Jahan N¹, Keya AT², Islam MT³, Begum RA⁴, Rahman N⁵, Mawa J⁶, Hai SSS⁷, Ghosh M⁸, Towhid SAA⁹, Matin MNI¹⁰**Abstract**

Background: Psoriasis is a common chronic immune-mediated inflammatory disease and is associated with systemic comorbidities. C-reactive protein, being a reflection of systemic inflammatory pathway and several studies has reported that increased C-reactive protein levels are associated with the psoriasis.

Objective: To investigate the association between serum C-reactive protein levels and psoriasis.

Materials and Methods: This case-control study was conducted in the Department of Physiology, Sylhet MAG Osmani Medical College in collaboration with Department of Dermatology and Venereology, Sylhet MAG Osmani Medical College Hospital from July 2021 to June 2022. Fifty adult patients with psoriasis and fifty age-gender matched healthy controls were selected. Serum C-reactive protein was measured.

Results: The mean serum C-reactive protein was significantly higher in psoriatic patients compared to control subjects (12.81 ± 4.84 mg/L versus 5.39 ± 1.56 mg/L; $p < 0.001$). Elevated serum C-reactive protein was found in 32 patients (64.0%) with psoriasis, compared to none in control group (0%); ($p < 0.001$).

Conclusion: C-reactive protein level is increased in psoriasis compared to controls and elevated C-reactive protein is an association with psoriasis.

Keywords: C-reactive protein, inflammatory disease, Psoriasis.

Introduction

Psoriasis is a chronic inflammatory disease mediated by T helper 1 (Th1) cells mediated, affecting 1-3% of the global population. The chronic inflammatory nature of psoriasis predisposes patients to other diseases with an inflammatory component, the most notable being cardiovascular and metabolic disorders.¹ Severe psoriasis is a chronic systemic inflammatory disorder and an independent risk factor of cardiovascular disease (CVD), as both psoriasis and atherosclerosis are T-helper (Th1 and Th17) cells mediated

inflammatory diseases.²

C-reactive protein is a polypeptide and acute phase reactant synthesized mainly by the hepatocytes during inflammation in response to certain cytokines.^{3,4} In psoriasis is T-cells (Th-1 and Th-17) produce pro-inflammatory cytokines (like IL-6, IL-17, IL-2, TNF- α and IFN- γ) resulting in inflammatory cascade and increased serum C-reactive protein level.⁵ C-reactive protein is considered an inflammatory biomarker, are believed to stem from

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IL-6 secretion induced by TNF- α .⁶ C-reactive protein is known to be the most sensitive indicator of inflammation. The magnitude of its increase is correlating with the extent of tissue injury and inflammation severity.⁷ Furthermore, C-reactive protein is identifiable within 24 to 48 hours after tissue damage or infection. C-reactive protein has 6 to 8 hours of half-life and has a wide dynamic range used as an important marker in clinical studies. It is reduced with a successful treatment. Moreover, assessing C-reactive protein serum values is a suitable, daily monitoring method, which can display a clear perspective of events occurring over the preceding 12 hours. The systemic inflammatory pathways may guide treatment of the disease.⁸

Several studies found significantly higher levels of C-reactive protein in patients with psoriasis compared to healthy controls.^{9,10} Due to paucity of data on serum C-reactive protein levels in patient with psoriasis, it was planned to study C-reactive protein levels in patients with psoriasis.

Materials and Methods

This case-control study was conducted in the Department of Physiology, Sylhet MAG Osmani Medical College between July 2021 and June 2022 in collaboration with the Department of Dermatology and Venereology. Fifty patients with psoriasis (case group) aged 16 years or above and 50 age-gender matched healthy subjects (control group) were included. Exclusion criteria were (1) History of acute bacterial, viral or fungal infections; (2) Patients with known cases of chronic diseases i.e., tuberculosis, chronic kidney disease, chronic liver disease, diabetes mellitus, hypertension; (3) Patients with known cases of chronic inflammatory diseases i.e., SLE, Rheumatoid arthritis, Gout, Psoriatic arthritis; (4) Patients with known cases of cardiovascular morbidities i.e., coronary artery disease, stroke; (4) Those were taking any of following medications for the preceding 2 weeks period (Diuretics, Salicylates, Ketoconazole, Theophylline, Pyrazinamide, Ethambutol); and (5) Pregnant women and lactating mothers.

The purpose and procedure of the study were discussed and informed written consent was obtained from each subject (patient and healthy subject). A proper diagnostic

works up of psoriasis was made by taking detail history and clinical examination. Patient history included disease duration, progression, severity, treatment history, concomitant illnesses, personal habits, such as smoking and alcohol intake. Family history of psoriasis, diabetes, and cardiovascular disease were also recorded. The diagnosis of psoriasis was made by consultant dermatologists and skin biopsy for histopathology was performed in suspected cases.

Blood pressure was measured; RBS, serum ALT and creatinine were estimated to exclude the hypertension, diabetes mellitus, chronic liver disease and chronic kidney disease, respectively. Those who met the inclusion criteria were taken as sample. In this way 50 patients with psoriasis were selected as case; and 50 age and gender-matched healthy subjects as control were enrolled from attendants of the patients or staffs of Sylhet MAG Osmani Medical College and Hospital.

Serum C-reactive protein, RBS, Serum ALT and Creatinine Level were estimated by Dry microslide chemistry method which was a full automated chemistry system. The VITROS C-reactive protein Slide method was performed using the VITROS C-reactive protein Slides and the VITROS Chemistry Products Calibrator Kit 7 on VITROS 350 System (Johnson & Johnson company, UK). Biochemical analysis of blood was performed at Pathology laboratory in Sylhet MAG Osmani Medical College.

An approval of the study protocol was taken from the Ethical Committee of Sylhet MAG Osmani Medical College prior to commencement of the study. Furthermore, an informed written consent was taken from all the subjects (psoriasis and healthy subjects). Data were processed and analyzed with the help of Statistical Package for Social Science (SPSS) Version 26. Quantitative data was expressed as mean $\pm$ SD (standard deviation) and comparison was done using unpaired 't' test. Qualitative data was expressed as frequency and percentage; and comparison was done using Chi-Square (χ^2) test or Fisher exact test. The P value of ≤ 0.05 was considered as statistically significant.

Results

The mean age of the participants was 34.82 ± 9.26 years (range, 18-55 years) in psoriasis group and was 34.60 ± 11.64 years (range, 17-60 years) in control group. The mean age of the subjects in both groups was almost identical ($t=0.105$; $p=0.917$). In psoriasis group, 72.0% of patients were aged between 21 to 40 years and in control group, 66.0% were between 21 to 40 years; difference was not significant ($p=0.265$) (Table-I).

There were 25 (50.0%) male and 25 (50.0%) female in psoriasis group; whereas 29 (58.0%) male and 21 (42.0%)

female in control group; difference was not significant ($\chi^2=0.644$; $p=0.422$) (Table-I).

The mean serum C-reactive protein level was 12.81 ± 4.84 (range, 6.8-26.3) mg/L in psoriasis and 5.39 ± 1.56 (range, 2.7-9.1) mg/L in control group; difference was statistically significant ($t=10.322$; $p<0.001$) (Figure-1).

Elevated serum C-reactive protein was found in 32 (64.0%) patients in psoriasis and none in control group. Elevated serum C-reactive protein was significantly more frequent in psoriasis compared to control group ($\chi^2=47.059$; $p<0.001$) (Figure-2).

Table I: Distribution of the participants according to baseline characteristics

Baseline characteristics	Study group		Test value	p value
	Psoriasis (n=50)	Control (n=50)		
Age				
≤ 20 years	2 (4.0)	2 (4.0)		
21-30 years	17 (34.0)	24 (48.0)		
31-40 years	19 (38.0)	9 (18.0)		*p=0.265
41-50 years	9 (18.0)	11 (22.0)		
51-60 years	3 (6.0)	4 (8.0)		
Mean ± SD	34.82 ± 9.26	34.60 ± 11.64	t=0.105	†p=0.917
Sex				
Male	25 (50.0)	29 (58.0)	χ ² =0.644	‡p=0.422
Female	25 (50.0)	21 (42.0)		

*Fisher exact test, † unpaired t test and ‡ Chi-Square test were used to analyze the data. Figure in the parenthesis

indicates corresponding percentage.

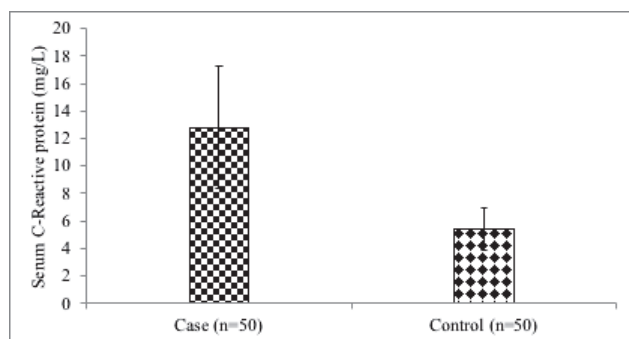


Figure-1: Distribution of the participants by serum C-reactive protein level. *unpaired 't' test was employed to find out the level of significance.

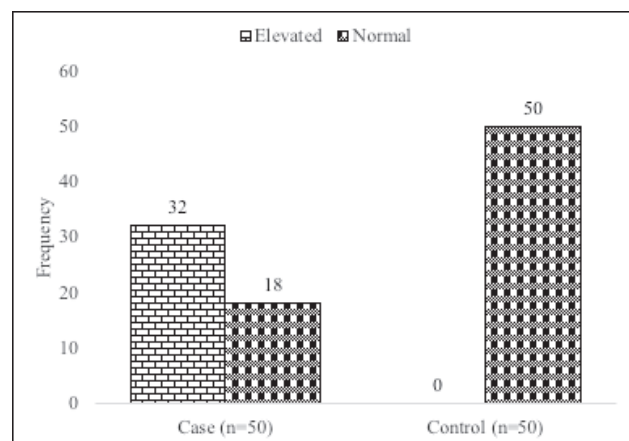


Figure-2: Comparison of raised serum C-reactive protein between psoriasis (case) and control. *Chi-Square (χ^2) test was employed to find out the level of significance.

Discussion

C-reactive protein is the most studied proinflammatory biomarker.¹¹ It is analytically stable and reproducible. C-reactive protein is produced in liver (hepatocytes) through action of IL-6 and IL-17 and other chemokines.¹²

In this study the mean age was 34.82 ± 9.26 years in patients with psoriasis and 34.60 ± 11.64 years in control group; difference was not significant ($p=0.917$). This result was consistent with some other studies.^{10,13} But other study reported higher mean age (54.1 ± 6.12 years) in patients with psoriasis.¹⁴

In the present study, psoriasis was equal frequency in male and female. This result was in line with a previous study.¹⁴

But male preponderance of psoriasis was reported in one study,⁵ while female preponderance of psoriasis in other study.¹⁰

In this study the mean C-reactive protein level was 12.81 ± 4.84 mg/L in patients with psoriasis and 5.39 ± 1.56 mg/L in control group; difference was statistically significant ($p<0.001$). This result was supported by the study of Balta et al.¹³ that C-reactive protein was significantly higher in psoriatic patients than in controls (5.9 ± 7.1 mg/L versus 3.1 ± 2.4 mg/L; $p=0.0003$). Several studies also showed that patients with psoriasis have significantly higher levels of C-reactive protein compared with healthy controls ($p < 0.004$ and $P<0.001$).¹⁵⁻¹⁹ But Das et al.²⁰ found no significant difference of C-reactive protein level between patients with psoriasis and healthy controls.

This study also stated that elevated serum C-reactive protein level was found in 32 (64.0%) patients with psoriasis and none of the participants in control group. Elevated serum C-reactive protein was significantly more frequent in patients with psoriasis compared to control group ($p<0.001$). A study supported this finding that C-reactive protein was significantly elevated (>5 mg/L) in psoriatic patients (52%) when compared with controls (14%) ($p=0.001$).⁹ Recently C-reactive protein is being shown to be more than a mere indicator of inflammation. Prospective epidemiological studies have demonstrated that C-reactive protein level is a strong predictor of future cardiovascular events in psoriasis.^{12,21} C-reactive protein is found within atheromatous plaque that correlates with vascular dysfunction and promotes secretion of inflammatory mediators by vascular endothelium. It has a direct role in cell adhesion, molecular expression and opsonizes low density lipoprotein for uptake by macrophages in the atherosclerotic plaque.²² In addition, C-reactive protein is a powerful, independent risk determinant of insulin resistance and a known risk factor for cardiovascular disease.²³

Limitations of the study were (1) sample size was small, (2) Single centre study, (3) cross sectional study and (4) There may be sampling bias because of non-random sampling technique.

Conclusion

From the findings of the present study, it may be concluded that C-reactive protein levels are increased in psoriasis compared to controls which suggest an association of psoriasis with this biomarker. High C-reactive protein levels are also associated with psoriasis. However, further prospective studies with a multicenter and large sample size are required to assess the effect C-reactive protein on the psoriasis disease process.

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Conflicts of interest: There are no conflicts of interest.

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Case Report

Sweet Syndrome in Cystitis in a Patient of Hypothyroidism with Diabetes Mellitus and Hypertension

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Abstract

Sweet syndrome, also known as acute febrile neutrophilic dermatosis, is a rare disorder that typically presents with rapid appearance of tender skin lesions accompanied by fever and leukocytosis with neutrophilia. Its pathogenesis is not fully understood. It has been associated with autoimmune processes, malignancies, infections, drug reactions, pregnancy and gastrointestinal disorders such as inflammatory bowel disease each of which has its specific characteristics. In this case report, We describe a case of classical Sweet syndrome in a 53-year old woman who presented with fever, polyarthritides, dysuria and suddenly developed multiple symmetrical erythematous based tender and pruritic skin papules of varying sizes and shapes at extremities, neck and upper trunk. Few targetoid lesions as well as erythema nodosum of variable sizes and shapes were found at the shin area of both legs. Patient had also dry cough, painless congested eyes with watery discharges. Skin biopsy and laboratory tests yielded a diagnosis of Sweet syndrome. She was successfully treated with systemic steroids. Our case was an unusual presentation of Sweet syndrome in a known patient of hypertension, diabetes mellitus, hypothyroidism with cystitis.

Keywords: Classical Sweet syndrome, febrile neutrophilic dermatoses, skin lesions.

Introduction

The Sweet Syndrome (SS) was originally described by Dr. Robert Douglas Sweet in 1964, as an “Acute Febrile Neutrophilic Dermatitis”.¹ Sweet Syndrome is an uncommon inflammatory cutaneous disorder. The skin eruptions which frequently present on the face, neck, trunk and extremities are generally accompanied by signs of systemic inflammation including pyrexia, malaise and arthralgia. These lesions are often accompanied by leukocytosis and fever, with more than 75% of patients having systemic symptoms.^{2,3} The etiology of Sweet Syndrome is unknown, but several features suggest that the dermatosis results from a hypersensitivity reaction to an eliciting

antigen; the source of antigen may be diverse such as bacterial, viral or tumour. It may be associated with antecedent infections, malignancies, autoimmune diseases, drugs and vaccines, granulocyte-colony stimulating factor as well as chemotherapy or idiopathic (associated with upper respiratory or gastro-intestinal infection, viral infections, pregnancy or inflammatory bowel diseases).^{1,4} Most commonly, it affects women between the ages of 30 to 70 years (female: male-7:1). However, Sweet syndrome has been reported in children and younger adults also. Clinically, it is characterized by acute onset of fever, cutaneous manifestations such as raised painful, erythematous,

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well-demarcated papules and plaques, typically few centimeters in size on the face, neck, trunk and extremities. Systemic symptoms include malaise, fever, headache, conjunctivitis, and arthralgia.

In some patients with malignancy, fever may be absent. Histologically, a dense perivascular neutrophilic infiltration with leukocytosis is the hallmark of Sweet Syndrome^{1,5}.

Case report

A 53 years old woman who was known case of hypothyroidism, hypertension and diabetes -got admission at Khulna Medical College Hospital, Khulna and was presented with fever for 25 days which was low grade, continued in nature, highest recorded temperature was 102° F, not associated with local symptoms, subsided only after taking Paracetamol. There was symmetrical polyarticular pain for same duration which was inflammatory in nature involving solely large joints particularly ankles, knees and wrist joints of both extremities but predominantly lower limbs and subsided after intake of NSAIDs. There was also complaint of sudden onset of tender and pruritic skin rash, particularly at dorsum of hands, forearms, upper back, nape of the neck and upper chest for 15 days as well as multiple erythematous and purple coloured tender nodules of variable sizes and shapes at the shin areas for the last 10 days. She also complained of burning micturition for same duration associated with urgency, frequency, lower abdominal pain, sense of incomplete voiding and the urine appeared cloudy with an unpleasant odour. On query, there was painless red eyes with watery discharges. Patient was taking thyroxine, insulin, metformin, amlodipine and atorvastatin on regular basis.

There was no history of trauma, haematuria, recurrent oral ulcer, weight loss, butterfly rash, photosensitivity, alopecia, pustular skin lesions and skin ulceration etc.

On general exam, patient was found ill-looking, mildly anaemic with congested conjunctiva(Fig.-1) and watery eyes, her pulse rate was 102 b/min. and regular rhythm, blood pressure was 150/90 mmHg and no postural drop, respiratory rate: 18 br/min, body temperature was 101°F with normal bed side urine examination.

On systemic examination, Integumentary system examination revealed multiple symmetrical erythematous based tender papules of varying sizes and shapes at dorsum of hands, forearms, upper back, nape of the neck and upper

chest with few targetoid lesions(Fig.-2). There were erythema nodosum of variable sizes and shape present at pretibial areas (Fig.-3).

Musculoskeletal system examination revealed symmetrical inflammatory polyarthritis particularly at both wrists, knees and ankles joints with variable grading along with restricted movements in all directions in absence of local signs. There is no other musculo-skeletal abnormalities.

Laboratory investigations

Haemoglobin level	10.7 g/dl
ESR	92mm in 1st hr
Total leukocytes count (TC)	13,500 cells/mm ³ of blood
Differential count (DC)	75 %
Neutrophils	
Lymphocytes	20%
Monocytes	4 %
Eosinophils	1%
Basophils	0%
Atypical cells/Blast cells	0%
Total platelet count	2,50,000/mm ³ of blood
Peripheral blood film	Normocytic normochromic anaemia with neutrophilia
CRP level	45mg/l
Urine routine analysis	
Pus cells	10-12/HPF
RBC	Nil
Sugar	Nil
Albumin	Nil
Urine culture	Colony of Escherichia coli
Fasting blood Sugar	7.7 mmol/l
Post-prandial blood sugar	9.8 mmol/l
Serum TSH	5.5 μ IU/ml
RA factor	Negative.
Serum ANA	Negative.
Serum creatinine	0.89 mg/dl

On ultrasonogram of whole abdomen revealed low lying uterus, intravesical debris, diffuse bowel gas and radiological study of peripheral joints of extremities revealed soft tissue swelling & there was no other abnormalities.

Full thickness excisional skin biopsy from the lesion for histopathological study revealed:

The surface is covered by thin layer of inflammatory crust. Mild acanthosis is present. The dermis reveals many infiltration of acute and chronic inflammatory cells both around the blood vessels and surrounding dermis. Superficial and deep perivascular and interstitial infiltrate composed mostly of neutrophils (Fig.-4). Eosinophils were also present. No granuloma is seen and vasculitis is absent.

These findings were compatible with Sweet syndrome.

The patient was then prescribed oral Ciprofloxacin 500mg 12 hourly for 7(seven) days along with prophylactic meas-

ures and thereby her urinary problems had been resolved. Thereafter, she is also prescribed with oral Prednisolone at 60mg/day, with a slow taper over a 2-month period, and her cutaneous lesions and arthritis were resolved.

She also followed up with medicine outpatient department and remained stable and symptom free. On regular follow up of the patient, there were no recurrences till date.

Our patient followed the revised diagnostic criteria of sweet syndrome (Box-1) with both major criteria and two minor criteria are needed for diagnosis.

A diagnosis of Classical Sweet syndrome with Cystitis was made.

Major criteria

1. Abrupt onset of painful erythematous plaques or nodules
2. Dense neutrophilic infiltrate without evidence of leukocytoclastic vasculitis by histopathology.

Minor criteria

1. Fever $>38^{\circ}\text{C}$
2. Association with an underlying haematologic or visceral malignancy, inflammatory disease, or pregnancy, or preceded by an upper respiratory or gastrointestinal infection or vaccination
3. Excellent response to treatment with systemic corticosteroids or potassium iodide
4. Abnormal laboratory values at presentation (three of four): erythrocyte sedimentation rate >20 mm/hour; positive C reactive protein; >8000 leucocytes; $>70\%$ neutrophils.



Figure-1: Conjunctivitis



Figure-2: Cutaneous lesions in both upper limbs.



Figure-3: Erythema nodosum (A) (B)

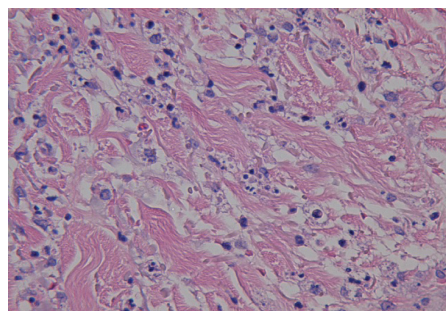


Figure-4: Histopathology shows the superficial and deep perivascular and interstitial infiltrate at low (A) and high (B) power.

Discussion

Sweet syndrome- described as a series of cases with distinct clinical and histological manifestations, including fever, neutrophilic leucocytosis of blood, raised painful plaques on skin and dermal infiltration by neutrophils. There are a number of factors described in the literature that can lead to the development of Sweet syndrome.³

Diagnosis of Sweet syndrome is based on typical clinical, laboratory and histological findings. Diagnostic criteria have been formulated to help clinicians to diagnose the disease.^{4,5} According to these criteria, two major and two minor criteria need to be fulfilled to make the diagnosis of Sweet syndrome (Box-1).

Sweet syndrome is associated with various clinical signs and symptoms. Fever is the most common symptom. In some cases, patients report prior upper respiratory tract infection and gastrointestinal tract infection as well. Skin lesions of Sweet syndrome are typically tender and appear as erythematous papules or nodules. Upper extremities, face and neck are the most common locations for skin lesions. Additionally, Sweet

syndrome can be manifested by extracutaneous lesions involving the central nervous system, kidneys, liver, lung and heart.^{3,6}

Sweet syndrome is classified into three distinct categories: classical Sweet syndrome, malignancy-associated Sweet syndrome and drug-induced Sweet syndrome.⁶ Classical Sweet syndrome is also called idiopathic Sweet syndrome and is associated with various conditions with the exception of malignancy and drugs. It is the most common type of Sweet syndrome.⁶ Malignancy-associated Sweet syndrome can be a cutaneous manifestation of undiagnosed malignancy or an initial sign of

recurrence of cancer.⁷ Sweet syndrome is associated with haematologic as well as solid malignancies. AML is one of the most common malignancies associated with Sweet syndrome.⁷ A variety of medications have been reported for drug-induced Sweet syndrome, including antibiotics, antineoplastic drugs, colony-stimulating factors and antiepileptics.⁶ In our patient, the underlying aetiology of developing Sweet syndrome could be associated with Cystitis.

To the best of our knowledge, there is few reported case in the literature of Sweet syndrome in association with cystitis. The pathogenesis of Sweet syndrome is not well understood, but there are some mechanisms that have been postulated in the development of the disease. These mechanisms include circulating autoantibodies, dermal dendrocytes, cytokines, immune complexes and genetic susceptibility.^{6,8-10} It may very well be that the pathogenesis of Sweet syndrome is multifactorial, a number of aetiologies playing specific roles in pathogenesis.

The cutaneous manifestations persist for weeks or months if not treated. Although clinical signs and symptoms may spontaneously regress after treating the underlying cause,¹¹ initial supportive

treatment is generally required to control the disease. The mainstay of treatment is corticosteroids. The usual initial dose is 1 mg/kg/day and can be tapered down over a period of 4-6 weeks.^{6,12-24} Alternatively, colchicine and potassium iodide can be used as a first-line therapy for patients who cannot tolerate steroids.^{13,14} Indomethacin, clofazamine, dapsone and ciclosporin can all be utilised as second-line treatment.^{5,15-17,25}

Several case reports mentioned that Sweet syndrome can also occur in association with several inflammatory autoimmune diseases. These include inflammatory bowel disease, rheumatoid arthritis, systemic lupus erythematosus, Sjogren's syndrome, Hashimoto thyroiditis, Behcet disease, and dermatomyositis.^{26,27} Our patient had none of these disease and corresponding specific features.

Post-infectious sweet syndrome has been described 1 to 3 weeks after upper respiratory and gastrointestinal infections^{6,26-27} but our patient had none of these rather she had urinary tract infection.

Our patient developed sweet syndrome on the background of hypothyroidism, diabetes mellitus, hypertension and urinary tract infection. This is rarely reported in currently published articles.

Sweet syndrome has association with other infections such as human immunodeficiency virus, viral hepatitis, tuberculosis have been described.²⁶⁻²⁷ Our patient had none of the specific symptoms of such infections.

Our patient also experienced inflammatory type of low back pain which is less reported in currently published articles.

Extracutaneous manifestations of sweet syndrome such as arthralgia, non-erosive arthritis, conjunctivitis have been reported. 26,28 Our patient also showed such kind of manifestations.

Moreover, myocarditis, aseptic meningitis, pleural effusion, alveolitis may occur as extracutaneous manifestations of sweet syndrome 26,28 but our patient had none of these manifestations.

Conclusion

Sweet's Syndrome has a broad spectrum of clinical and pathologic findings in various areas of the world. Further investigations are necessary to determine the etiology and effect of environmental factors on the disease. Sweet syndrome should be differentiated from cellulitis and vasculitis due to similarities in their clinical features. We appreciate the difficulty in the initial diagnosis of Sweet Syndrome. Patient education should include the information about the variable course of this condition, as well as advice on self monitoring for signs and symptoms of other diseases.

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