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COMPARISON OF POVIDONE-IODINE *VS* CHLOROHEXIDINE IN PRE-OPERATIVE SKIN PREPARATION IN ELECTIVE ORTHOPEDIC SURGERY CASES

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ABSTRACT: Introduction: SSI (Surgical site infection) is the dreaded complication following orthopaedic surgery. The main source of surgical site infection is the patient's own skin flora. So skin preparation plays a major role in preventing the SSI. This study aims to compare povidone-iodine and 2% chlorohexidine alcohol in pre-operative skin preparation in elective orthopedic surgery and followed uo for 4 weeks for and postop SSI. **Methods:**This was a prospective study of 30 patients who underwent elective orthopaedic procedures between October 2021 to November 2021 with a follow-up duration of 4 weeks. A group of 30 patients of both sexes, different age groups with associated co-morbidities were included in our study. **Results:** They were divided into 2 groups of 15. Group-1 consisted of 9 males and 6 females; their mean age was 51, of which 9 had associated co-morbidities. Group-2 consisted of 8 males and 7 females. There were statistical differences ($p<0.05$) between co-morbidites in both groups and no statistical difference in risk factors between the two groups in terms of age and gender. In group 1 there were 6 surgical site infections, and in group 2 there were 3 cases of surgical site infection identified. The overall rate of SSI was lower in group-2 (chlorohexidine gluconate with alcohol). **Conclusion:** In this study, we conclude that 2%Chlorohexidine with alcohol can be used instead of povidone-iodine for pre-operative skin preparation agent in elective orthopaedic surgeries as the rate of SSI and complications were lesser with this agent.

INTRODUCTION: SSI (Surgical site infection) is the dreaded complication following orthopaedic surgery. It leads to increased morbidity and prolonged hospital stay. The main source of surgical site infection is the patient's own skin flora [1]. So skin preparation plays a major role in preventing the SSI, as no antiseptic agent can completely sterilize the tissue.

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The reduction of bacterial colonization depends on concentration and exposure to antiseptic agents [2]. The measurement of positive skin culture is used to compare the efficacy of antiseptic preparations. Based on this method, the effectiveness of the two most widely used antiseptic agents in reducing bacterial colonization was determined according to the current literature [3, 4].

Povidone-iodine is used as one of the common agents for skin preparation in elective orthopaedic surgeries. Various studies also prove that 2%chlorohexidine with alcohol is better than povidone-iodine as a pre-operative skin preparation agent [5, 6].

This study aimed to determine the efficacy of pre-operative skin preparation with 2% chlorhexidine with alcohol compared to povidone-iodine in reducing the natural bacterial skin flora.

METHODS: The study was conducted as a prospective study of 30 patients who underwent elective orthopaedic procedures between October 2021 to November 2021 with a follow-up duration of 4 weeks. Ethical committee approval was obtained, and IEC NO: SMC/IEC/2020/11/51. A group of 30 patients of both sexes and different age groups with associated co-morbidities was included in our study. Inclusion criteria were patients with closed elective orthopaedic procedures. And exclusion criteria were patient refusal to participate, fractures with and inability to follow up for 4 weeks, and open injury. Each group contains 15 patients with aged 22 to 60 willing for the procedure. All routine pre-operative blood investigations were done. The patient was positioned in the operating table after appropriate anasthesia. The pre-operative preparation used in 1st group was povidone-iodine; in 2nd-second group, 2% chlorohexidine with alcohol was used and the solution was applied in the concentric circle manner, allowed to dry for 5 min. Pre-operative and post-operative antibiotics used in both groups were constant according to hospital antibiotic protocol policy, and draping was kept constant. Post-operatively wound was examined, and a swab from the suture site was taken at 2nd, 5th, 10th day and at the end of 4 weeks. And was sent for gram staining and culture and sensitivity. The culture growth identified surgical site infection. And the data were collected in a spread sheet and analyzed.

RESULTS: A group of 30 patients of both sexes and different age groups with associated co-morbidities was included in our study. They were divided into 2 groups of 15. Group-1 consisted of 9 males and 6 females; their mean age was 51, of which 9 had associated co-morbidities. Group-2 consisted of 8 males and 7 females, and their mean age was 38, among which had 3 had associated co-morbidities Povidone-iodine was used as the pre-operative antiseptic for the first group, and Chlorohexidine gluconate with alcohol scrub for the second group. There were statistical differences ($p<0.05$) between co-morbidites in both groups and no statistical difference in the risk factors between the two groups in terms of age and gender. In group 1 there were 6 surgical site infections and in group 2 there were 3 cases of surgical site infection identified. The overall incidence of SSI was lower in group-2 (chlorohexidine gluconate with alcohol). **Fig. 1** A case of allergic dermatitis was noted in group 1 and was treated conservatively with medications no such reactions were found in group 2.

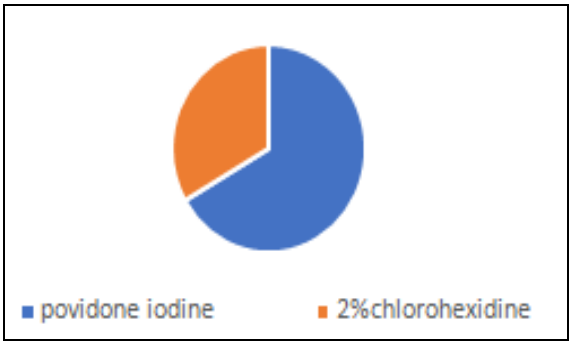

FIG. 1: RATE OF SSI

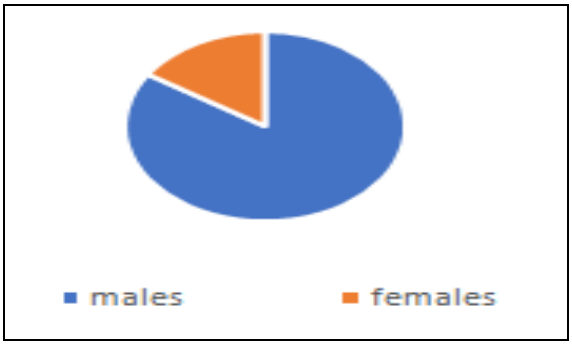

FIG. 2: GENDER

DISCUSSION: It has been widely explored and concluded that no solitary gold standard test exists to diagnose surgical site wound infection [7]. Skin as a whole contributes as the salient source of pathogens that cause surgical site infection; hence, priming the skin with pre-operative antiseptic skin preparation may decrease the likelihood of post-operative infections. This has been widely propagated by The CDC as well as the Royal College of Surgeons of England. The hazard of developing surgical site infection in case of elective Orthopedic surgeries may be due to bacterial contamination during the interop period, the duration of the specified procedure, or due to patient's low immune status or associated co-morbidities like Diabetes Mellitus, which increases the risk of infection. The CDC guidelines suggest that patient's clean themselves with an antiseptic

solution the night before the procedure and that the skin is prepared with a pertinent antiseptic agent. Although there are no advocations favouring chlorhexidine or povidone-iodine, Paochaoren V *et al.* in their study on antiseptic skin preparation for general surgery patients, concluded that chlorohexidine remarkably lessened the colonization of bacteria and the prevalence of post-operative wound infection [7].

TABLE 1: PATIENTS DEMOGRAPHICS AND DATA

S. no.	Age	Sex	Side	Co-morbidities	Pre Op Antiseptic Used	Adverse effects in skin	Duration of surgery	Size of Wound	Follow-up of surgical wound				Wound Gaping
									2nd day	5th day	10th day	4 weeks	
1.	24	M	Right upper limb	No	Chlorohexidine 2%	NO	3 hrs	5 cm	-ve	-ve	-ve	-ve	No
2.	36	F	Right lower limb	Yes-DM/HTN	Povidone iodine 7.5%	NO	2hrs	3 cm	-ve	-ve	-ve	+ve	Yes
3.	27	M	Left upper limb	No	Chlorohexidine 2%	NO	1hr	5 cm	-ve	-ve	-ve	-ve	No
4.	33	F	Right upper limb	No	Povidone iodine 7.5%	Yes	1 hr	4.5cm	-ve	-ve	-ve	-ve	No
5.	45	F	Left lower limb	No	Chlorohexidine 2%	NO	2hr	8cm	-ve	-ve	-ve	-ve	No
6.	22	F	Left lower limb	No	Chlorohexidine 2%	NO	3Hr	10cm	-ve	-ve	-ve	-ve	No
7.	37	F	Left upper limb	Yes-DM/HTN	Povidone iodine 7.5%	NO	2hr	15cm	-ve	-ve	-ve	-ve	No
8.	31	M	Right lower limb	Yes-HTN	Chlorohexidine 2%	NO	2hr	6cm	-ve	-ve	-ve	-ve	No
9.	60	M	Left lower limb	No	Chlorohexidine 2%	NO	3hrs	10cm	-ve	-ve	-ve	+ve	Yes
10.	42	M	Right upper limb	No	Povidone iodine 7.5%	NO	1hr	5cm	-ve	-ve	-ve	-ve	No
11.	56	M	Right lower limb	Yes-DM	Povidone iodine 7.5%	NO	3hr	12cm	-ve	-ve	-ve	-ve	No
12.	40	M	Right lower limb	No	Chlorohexidine 2%	NO	3hr	7cm	-ve	-ve	-ve	+ve	Yes
13.	39	M	Left lower limb	Yes-HTN	Chlorohexidine 2%	NO	3hr	4cm	-ve	-ve	-ve	-ve	No
14.	24	M	Right upper limb	No	Chlorohexidine 2%	NO	1hr	4cm	-ve	-ve	-ve	-ve	No
14.	51	F	Right lower limb	No	Chlorohexidine 2%	NO	1hr	7cm	-ve	-ve	+ve	+ve	Yes
16.	52	M	Left upper	No	Povidone iodine 7.5%	NO	4hrs	15cm	-ve	-ve	-ve	+ve	Yes

			limb										
17.	38	F	Right lower limb	No	Povidone iodine 7.5%	NO	2hr	7cm	-ve	-ve	-ve	-ve	No
18.	47	M	Left lower limb	Yes-DM	Povidone iodine 7.5%	NO	2hr	6cm	-ve	-ve	-ve	-ve	No
19.	45	F	Right upper limb	No	Chlorohexidine 2%	NO	2hr	7cm	-ve	-ve	-ve	-ve	No
20.	42	F	Left upper limb	No	Chlorohexidine 2%	NO	2hr	5cm	-ve	-ve	-ve	-ve	No
21.	60	M	Left lower limb	YES-DM/HTN	Chlorohexidine 2%	NO	2hr	6cm	-ve	-ve	-ve	-ve	No
22.	29	F	Left upper limb	No	Chlorohexidine 2%	NO	3hr	6 cm	-ve	-ve	-ve	-ve	No
23.	35	F	Right lower limb	NO	Chlorohexidine 2%	NO	4hr	10cm	-ve	-ve	-ve	-ve	No
24.	36	F	Left lower limb	NO	Povidone iodine 7.5%	NO	3hr	9cm	-ve	-ve	-ve	+ve	Yes
25.	43	M	Right upper limb	YES-DM/HTN	Povidone iodine 7.5%	NO	4hr	4cm	-ve	-ve	-ve	-ve	No
26.	54	M	Left Lower limb	YES-DM/HTN	Povidone iodine 7.5%	NO	5hr	15cm	-ve	-ve	-ve	+ve	Yes
27.	70	M	Left lower limb	YES-DM/HTN	Povidone iodine 7.5%	NO	3hr	9cm	+ve	+ve	+ve	-ve	No
28.	69	M	Right upper limb	NO	Povidone iodine 7.5%	NO	3hrs	6cm	-ve	-ve	-ve	-ve	No
29.	81	F	Left upper limb	YES-DM	Povidone iodine 7.5%	NO	2hrs	5cm	-ve	-ve	-ve	-ve	No
30.	78	M	Right upper limb	YES-DM	Povidone iodine 7.5%	NO	3hrs	6cm	-ve	+ve	+ve	+ve	Yes

DM-Diabetes mellitus, HTN-Hypertension, M-Male, F-Female

The same was almost inferred by Veiga *et al.* in their study that chlorhexidine is one step ahead for use as a skin antiseptic before performing clean plastic surgery procedures [8]. Dumville *et al.* corroborated that perioperative skin preparation with chlorhexidine was affiliated with lower rates of SSIs compared to povidone-iodine after a clean surgical procedure [9]. In our study, we held the upper hand in minimizing the modifiable risk factors like underlying disease conditions and the duration of the proposed procedure. The groups were standardized with inclusion and exclusion criteria [10, 11, 12]. Pre-operative skin preparation protocol was not taken into our control. After the study analysis, we concluded that there were no major statistical differences in age, operative time, and gender [13]. The rate of SSI in the Povidone iodine group was 6 and in the chlorhexidine group was 3. [14, 15]. Other disadvantages of povidone-iodine usage were colour staining and hypersensitivity reactions that were absent from chlorhexidine.

CONCLUSION: In this study, we conclude that 2%Chlorohexidine with alcohol can be used instead of povidone-iodine for pre-operative skin

preparation agent in elective orthopaedic surgeries as the rate of SSI and complications were lesser with this agent.

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