EFFECT OF HONEY IMPREGNATED DRESSING V/S SILVER SULFADAZINE IN HEALING OF CHRONIC ULCER AND BURNS.

By

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Dissertation Submitted to
Sumandeep Vidyapeeth, Piparia, Vadodara.
In partial fulfilment
of the requirements for the degree of

"MASTER OF SURGERY"

(BRANCH-I)

GENERAL SURGERY

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DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation/thesis entitled **"EFFECT OF HONEY IMPREGNATED DRESSING V/S SILVER SULFADAZINE IN HEALING OF CHRONIC ULCER AND BURNS"** is a bonafide and genuine research work carried out by me under the guidance of **Dr. Mahesh Pukar (Professor).**

DR. AAKASH B. RAJSHAKHA

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This is to certify that the dissertation entitled **"EFFECT OF HONEY IMPREGNATED DRESSING V/S SILVER SULFADAZINE IN HEALING OF CHRONIC ULCER AND BURNS"**is a bonafide record of research work done by Dr. Aakash B. Rajshakha in partial fulfillment of the requirement for the degree of Masters of Surgery, under my supervision, guidance and to my full satisfaction.

It is certified that the study is original.

Dr. Mahesh Pukar
Professor
Department of General Surgery

Date:
Place: Piparia

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ACKNOWLEDGEMENT

I am thankful to my parents whose unforgettable sacrifices and choicest, blessing has provided me the opportunity to be educated. No endeavor can start, continue and complete without the blessing of almighty God. The progress of human being in every field is because they pass on their heritage from one generation to another. Generation dies but their knowledge is passed on to the next, which after confirming the old facts & adding its own experience, in turn passes all these to the next generation.

I would like to thank my Father **Babubhai B. Bokhiria** whose priceless love, hard work, support and guidance has made me what I am today. I am thankful to my mother **Jyotiben B. Bokhiria** whose unforgettable sacrifices, blessings and love have provided me strength to complete this work. I am thankful to **my wife Dr. Rajvee Rajshakha, my brother Dr. Pruthvi B. Rajshakha and my sisters Geeta Odedara, Bharti Odedra and Pooja Odedra.**

I would also like to thank my guide **Dr. Mahesh Pukar,** M.S., Professor, Department Of Surgery,SBKS Medical Institute & Research Centre, Piparia, Whose brilliant foresight and practical approach coupled with continuous encouragement and personal attention has been the guiding force behind all my efforts in giving shape to this project.I would like to express my heartfelt gratitude and deep appreciation to my esteemed teachers**, Dr. Rajesh Bharaney, Dr Vijoy Singh, Dr. R. M. Manolkar, Dr.Bhagwati Salgotra, Dr. R.V.Mhapshaker, Dr Amit Doshi, Dr.Honeypalsinh, Dr Mehul Panchal,** for their constant help, support and tips given duringthe period of study and throughout the course.

Dr. G. V. Shah (Faculty Dean), SBKS Medical Institute & ResearchCentre, for providing me the faculties to carry out my dissertation.

I acknowledge the unconditional support and inestimable aid given to me by friends Dr. Honeypalsinh Maharaul, **Dr. Sagar Vaghela, Dr. Rajvee Shukla**

This work would not have taken proper shape without the active involvement of all the **patients** who shared their time & experience despite their troubles.

I would express my sincere gratitude to my seniors and colleagues Dr. Mosam Shah, Dr. Hardik Patel, Dr. Naveen Kumar and Dr. Harsh Thakkar.

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ABSTRACT:

INTRODUCTION:

The exact number of wound cases is difficult to determine; however, in a country like India, with a population of over 1 billion, there are around 700,000-800,000 burn admissions per year. [1] With availability of various products for dressing this study intends to compare honey dressing v/s silver sulfadiazine at our institute.

MATERIALS AND METHODS:

Type of Study: Prospective Observational

Study Design: Cross Sectional Study

Study Population:

- **Age:** more than 18 years
- **Gender:** Both male & female

Study Duration: 12 Months

Study Centre: Department of Surgery, Dhiraj General Hospital

Study Sample Size: In present study, we have enrolled total 40 patients.

RESULTS:

Out of total 40 patients 57.50 % were male and 42.50% were female and all the patients were divided into two groups i.e. Honey group and SSD group.Mean age of all the enrolled participants was 59.91 ± 9.89 years.Mean healing days required was significantly less in honey group compare to mean healing days required in SSD group, i.e. 12.47±4.15 vs. 15.78±5.78. We found p value was 0.000 which is highly significant.

CONCLUSION:

Honey dressings is superior to Silver sulfadiazine (SSD) in chronic ulcer and burns, in terms of decreased morbidity, economy, patient well-being and speedy rehabilitation.

KEYWORDS:

Honey dressing, silver sulfadiazine, wound, burns.

INTRODUCTION:

The exact number of wound cases is difficult to determine; however, in a country like India, with a population of over 1 billion, there are around 700,000-800,000 burn admissions per year. [1] Wound injuries to the skin result in loss of its protective function as a barrier to micro-organisms leading to the high risk of infection. Thus, patients with wound face high morbidity than mortality because of the large uncovered skin surface getting infected, healing of which takes long periods of dressings, leading to deformities and contractures.[2] Unfortunately, the management of the wounds still remains a matter of debate and an ideal dressing for various wounds has not been discovered. [2] Moreover, in developing countries, wound management is riddled with difficulties.

The utilization of topical chemotherapy has been key in such manner and has enhanced the survival of patients with real consumes and to limit the frequency of consume wound sepsis, a main source of mortality and bleakness in these patients [2]. One of the methodologies that is increasing recharged consideration for fighting the danger of bacterial contamination and averting wound sepsis, is the utilization of honorable metal antimicrobials the most predominant of which is silver [3]. For a considerable length of time silver has been known to have bactericidal properties. As right on time as 1000 B.C., the antimicrobial properties of silver in rendering water consumable were acknowledged [4,5]. Silver mixes have been abused for their restorative properties for quite a long time too [6]. They were mainstream solutions for lockjaw and stiffness in the nineteenth century and for colds and gonorrhea before the coming of anti-infection agents in the early piece of the twentieth century [7]. A definite verifiable survey about the early utilization of silver to treat different conditions has been as of late distributed [8]. Enthusiasm for silver salts or silver salt arrangements in the treatment of consume patients, be that as it may, totally vanished around the Second World War [9]. It took numerous years for enthusiasm for silver (nitrate) to restore, under the jolt of a production by Moyer et al. [10]. At present, silver has reemerged as a feasible

treatment choice for diseases experienced in consumes, open injuries, and chronic ulcers.

Several Products have incorporate silver for use as a topical antibacterial specialist, for example, silver nitrate, silver sulphadiazine (SSD) (FlammazineTM, Smith and Nephew Healthcare Limited, Hull, Canada) [11], silver sulphadiazine/chlorhexidine (Silverex1, Motiff Laboratories Pvt. Ltd. Kare Health fortes, Verna, Goa), SSD with cerium nitrate (Flammacerium1, Solvay, Brussels, Belgium), and silver sulphadiazine impregnated lipidocolloid wound dressing Urgotul SSD1 (Laboratories Urgo, Chenove, France) [5,11– 13]. As opposed to these silver operators, recently created items, for example, ActicoatTM (Westaim Biomedical Inc., Fort Saskatchewan, Alberta, Canada) and Silverlon1 (Argentum Medical, L.L.C., Lakemont, Georgia) have a more controlled and delayed arrival of nanocrystalline silver to the injury region. This method of silver conveyance enables the dressings to be changed with less recurrence, along these lines diminishing danger of nosocomial contamination, cost of care, additionally tissue harm and patient distress [4,14– 16].

The best quality level in topical consume treatment is silver sulfadiazine (Ag-SD), a helpful antibacterial specialist for consume wound treatment. Late discoveries, notwithstanding, demonstrate that the compound postpones the injury recuperating process [17] and that silver may have genuine cytotoxic movement on different host cells [2,17– 22]. Then again, the useful impacts of silver on wound science because of its intense antimicrobial movement have been disregarded as a rule as of not long ago. The writing is getting to be plainly loaded with clinical trials implying to demonstrate the advantages of silver therapeutics and silver-discharge dressings on wound repair and recovery through its antimicrobial viability. Little is distributed, in any case, to demonstrate how the discharged silver particle impacts the injury bed, or to what degree it is utilized or saved in the tissue. Also, consequences of the broad writing audit we led neglected to uncover any clinical examinations in regards to the dangers and probabilities of wounds as a rule to end

up noticeably tainted, about the impact of silver dressings on officially contaminated injuries, nor about investigations contrasting the impact of silver or other germicide dressings on aversion of wound disease.

Regardless of the source of silver, whether discharged from arrangements, creams and salves or nanocrystalline silver discharged from economically accessible new dressings, silver is profoundly harmful to both keratinocytes and fibroblasts [23]. Fibroblasts give off an impression of being more touchy to silver than keratinocytes. Thought of the cytotoxic impacts of silver and silver-based items ought to be taken when settling on dressings for particular injury mind procedures. This is especially vital when utilizing keratinocyte culture, in situ, which is assuming an expanding part in contemporary injury and consume mind [23,24]. Also, certain current clinical investigations in significant consume focuses have exhibited the rise of bacterial safe strains basically Escherichia coli, to silver and to numerous anti-microbials following the delayed use of silver based dressings. The present survey goes for looking at all accessible confirmation about impacts, frequently conflicting, of silver on wound disease control and on wound recuperating attempting to decide the pragmatic helpful harmony between antimicrobial action and cell poisonous quality.

Honey has for some time been recorded as having recuperating properties [27, 28, 29]. Honey and sugar paste were related with scarless mending in cavity wounds [30]. It has been accounted for that rabbit wounds treated with a topical utilization of Honey indicated less edema, less polymorphonuclear and mononuclear cell penetrations, less rot, better wound constriction, enhanced epithelialization, and lower glycosaminoglycan and proteoglycan concentrations [31]. Besides, Honey causes essentially more noteworthy injury compression than controls, and it advances the development of granulation tissue and epithelialization of wounds [32, 33, 34, 35, 36, 37]. Honey fortifies tissue development, combination of collagen, and improvement of fresh recruit’s vessels in the bed of wounds

[38,39,40,41,42,43]. Intraperitoneal Honey organization after a bond demonstrate in the cecum and terminal ileum of rats decreased postoperative adhesion [44].

For the most part, wound healing can be influenced by endogenous (pathophysiology) and exogenous (microorganisms) factors. The danger of wound contamination increments as neighborhood conditions support bacterial intrusion and development. Accordingly, microbial colonization of both intense and interminable injuries is inescapable. Numerous types of microbes have been recouped from wounds, yet Staphylococcus aureus is the most much of the time detached from wound pathogens [45]. What's more, Pseudomonas aeruginosa is a vital pathogen in perpetual injuries and consumes; its quality has been exhibited in various examinations and has been found in one third of unending leg ulcers[46,47,48,49]. Contamination with S. aureus and pseudomonads impedes ulcer recuperating rates and, with pseudomonads and B-hemolytic streptococcus, decreases the achievement of skin joins utilized for leg ulcers[50,51]. The across the board improvement of anti-infection safe microscopic organisms is a testing issue. Consequently, ebb and flow intrigue is centered around a contrasting option to anti-toxins and customary treatments, for example, Honey, antimicrobial dampness retentive dressings, fundamental oils and cationic peptides, topical catalysts, biosurgical treatments, and vacuum treatments. Moreover, unregulated aggravation caused by the two microorganisms and fundamental strange pathophysiological conditions is a main consideration related with the way toward recuperating in perpetual wounds[52]. Many research works detailed the utilization of Honey for treatment of the two injuries and infections[53,54,55]. Table 1 abridges many papers that detailed effective utilization of Honey in wound mending. Honey with demonstrated antibacterial action can possibly be a powerful treatment choice for wounds contaminated or in danger of disease with different human pathogens. The restorative writing on treating wounds with Honey has been reviewed[56,57,58,59,60,61]. As a dressing on wounds, Honey gives a sodden recuperating condition, quickly clears disease, freshens up, and decreases

aggravation, edema, and exudation. It expands the rate of recuperating by incitement of angiogenesis, granulation, and epithelialization[62].

This study intends to compare honey dressing v/s silver sulfadiazine at our institute.

AIMS:

- To review and study patients who presented with chronic ulcer and burns and to study the effect of honey dressing on such wounds.

OBJECTIVES:

1. To study the effects of honey on wound with respect to its hygroscopic action, bactericidal action.

2. To study the effect of honey on wound healing time and compare with silver sulfadiazine.

3. To study complications of honey dressing.

REVIEW OF LITERATURE:

Basic silver requires ionization for antimicrobial viability [25]. Silver particle is an exceptionally responsive animal groups, promptly authoritative to contrarily charged proteins, RNA, DNA, chloride particles, et cetera. This property lies at the core of its antibacterial component yet additionally muddles conveyance to the injury bed, since it is promptly bound to proteins inside the perplexing injury liquid [26]. Distinctive silver conveyance frameworks exist, including those that convey silver from ionic mixes, for example, silver calcium phosphate and silver chloride, and those that convey silver from metallic mixes, for example, nanocrystalline silver [27,28]. In any case, the troubles with numerous current topical silver antimicrobials lie in their low silver discharge levels, the set number of silver species discharged, the absence of infiltration, the fast utilization of silver particles, and the nearness of nitrate or cream bases that are expert incendiary adversely influencing wound recuperating. Different issues incorporate recoloring, electrolyte awkwardness, and patient uneasiness. In the course of recent years, there has been a quick increment in the quantity of silver dressings made accessible to doctors to address these issues [27,29]. Different accessible silver items might be abridged as takes after:

- Colloidal silver arrangements—electrically charged This is the most widely recognized conveyance framework preceding 1960. Charged unadulterated silver particles (3– 5 ppm) are held in suspension by little electric streams. Positive particles repulse each different consequently stay in arrangement notwithstanding when connected topically to an injury.

- Silver proteins Consist of silver complexed to little proteins with a specific end goal to enhance steadiness in arrangement. These however demonstrated to have significantly less antibacterial activity than unadulterated ionic silver and were quickly supplanted by silver salts in the 1960s. 2.3. Silver

salts Delivery framework turns out to be more steady when decidedly charged silver particle is complexed to adversely charged particles (AgCl, AgNO3, AgSO4). 0.5% Silver nitrate is the standard and most well known silver salt arrangement utilized for topical consume wound treatment. Focuses surpassing 1% silver nitrate are poisonous to the tissues. Ionic silver arrangements are profoundly bactericidal, with no announced resistance and have a gainful impact in diminishing injury surface aggravation. The arrangements, be that as it may, are shaky and when presented to light create commonplace dark stains along these lines to a great degree strange. Then again, nitrate is dangerous to wounds and to cells and seems to diminish recuperating counterbalancing to some degree the helpful antibacterial impact of silver. Additionally, the lessening of nitrate to nitrite causes oxidant incited cell harm. This impact is no doubt the purpose behind the weakened re-epithelialization revealed with its utilization in halfway thickness consumes or benefactor locales. Bacterial imperviousness to AgNO3 has been portrayed.

- Silver mixes—silver sulfadiazine Silver sulfadiazine (Flammazine1, Silvadene1) was presented by Fox [30] in 1970s as an antibacterial operator for topical treatment of consumes and wounds. Silver is complexed to propyleneglycol, stearyl liquor, and isopropyl myrislate and blended with the anti-infection Sulfadiazine delivering a consolidated detailing produced using silver nitrate and sodium sulphadiazine by substituting a silver iota for a hydrogen particle in the sulphadiazine atom and joining the inhibitory activity of the silver with the antibacterial impact of sulphadiazine [9,31]. This silver complex follows up on the bacterial divider in contradistinction to the silver particles which follow up on the bacterial vitality framework. A wide range of mixes of sulpha drugs with silver were tried in vitro, yet silver sulphadiazine seemed, by all accounts, to be the best [32]. A conceivable clarification of this adequacy could be the moderately solid holding of silver sulphadiazine to DNA [9] which varies from that of silver nitrate or other silver salts [9,33]. Bacterial imperviousness to these items develops. Debilitated re-epithelialization has

been depicted. Watched bone marrow poisonous quality with silver sulfadiazine is essentially because of the propylene glycol part.

- Supported silver discharging frameworks—nanocrystalline silver Various silver-based dressings have been presented in the previous couple of years and have turned into the most recent and most prominent ""development"" in wound care items. The ""advancement"" engaged with these new twisted care items is simply the straightforward reality that silver is joined inside the dressing as opposed to being connected as a different salt, compound, or arrangement. The essential issues in picking a silver-containing dressing can be extensively conceptualized as far as: (1) the qualities of the ""transporter"" dressing and (2) the conveyance of silver by the dressing to the injury. Remembering these fundamental issues can enable comprehend a portion of the media showcasing rush going with these items [26]. The accompanying rundown of accessible silver dressings is not planned to be comprehensive, as the rundown is developing quickly. Or maybe, it ought to be viewed as representing different bearer dressing materials utilized as a part of conjunction with different silver conveyance ""repositories"" [26]. - Acticoat-7 (Smith and Nephew, Hull, United Kingdom) dressing comprises of three layers of polyethylene work covered with nanocrystalline (<20 nm breadth) silver and two layers of rayon polyester. The nanocrystalline silver expert vides an underlying expansive bolus of silver to the injury took after by a managed discharge.

- Actisorb Silver 220 (Johnson and Johnson, New Brunswick, N.J.) is an initiated charcoal dressing to which silver is bound. Actisorb works by adsorbing microscopic organisms onto the charcoal segment, where they are executed by silver. The "scent eating" nature of the charcoal is utilized as a promoting center.

- Aquacel-Ag hydrofiber (Convatec, Skillman, N.J.; 70:30 sodium: silver carboxymethylcellulose hydrofiber) is an absorptive dressing. Silver particle is

dislodged from the carboxymethylcellulose bearer as it is hydrated, subsequently accomplishing a steady, managed moderate discharge.

- Arglaes (Medline, Mundelein, Ill.) is silver-impregnated polymer film. The silver repository is Ag/CaPo4, shaped as glasses co-expelled in a polymer grid.
- Contreet-H (Coloplast, Marietta, Ga.) is a thick hydrocolloid dressing that has silver bound to the hydrocolloid.
- SilvaSorb (Medline) is a polyacrylate lattice with a silver halide repository.
- Silverlon (Argentum LLC, Willowbrook, Ill.) is a polymeric texture covered with metallic silver via autocatalytic electroless synthetic plating. An advertising center is the three-dimen-sional texture, which has a vast surface zone and is adaptable.

Silver items viability

Not very many randomized forthcoming examinations on the utilization of silver have been distributed [26] notwithstanding, the part and the system of activity of silver particles in vivo keep on providing a consistent commitment to the surgical writing [23]. For silver to be organically dynamic, it must be in a dissolvable frame, for example, Ag+ or Ag0 groups [34,35] and any silver dressing adequacy is dictated by add up to accessible solvent silver, not add up to silver in the dressing [36]. Ag0 is the metallic or uncharged type of silver found in crystalline, including nanocrystalline, silver structures. In arrangement, it exists in a sub-crystalline frame, under eight particles in estimate. Ag+ is the commonplace ionic shape show in silver nitrate, silver sulfadiazine and other ionic silver mixes [34]. In wound administration, silver amounts ought to be adequate to give maintained bactericidal activity [34]. Since there is no reason for having a long span of movement if the low focus may bring about the improvement of resistance, keeping up a sufficient grouping of silver in a dressing after some time has been a test. Metallic-covered dressings discharge silver over a long stretch however give a low

centralization of silver in the injury bed. Silver nitrate has a high grouping of silver yet no lingering movement requiring extremely visit applications up to 12 times each day. Silver sulfadiazine, then again, gives a satisfactory convergence of silver yet has restricted remaining action. Be that as it may, it is a huge change over silver nitrate since it should be connected just twice every day. Galvanic activity has a long span of discharge however a low convergence of silver. Silver carbomethylcellulose discharges a low convergence of silver and has no leftover action. Silver calcium phosphate and silver chloride discharge silver over a long stretch however not at sufficiently high fixations [27,37]. Silver discharge at focuses up to 3200 ppm is watched following utilization of silver nitrate or silver sulfadiazine (discharge from silver sulfadiazine is much slower than that from silver nitrate). The huge prompt centralization of silver particles discharged after silver nitrate application turns out to be artificially devoured and quickly inactivated through the development of concoction buildings by chloride inside two hours. This can be remunerated by visit substitution requiring a few day by day dressing changes. In consume units silver sulfadiazine is normally connected twice every day and silver nitrate up to 12 times each day. Visit dressings, nonetheless, make issues for medicinal services experts and patients, and result in substantial overabundances of silver being conveyed to the injury. [34]. Then again, the nature of the solute influences likewise the organic action of silver. In phosphate-cradled saline, silver can be dynamic in fixations as low as 0.05 ppm, yet natural issue essentially reduces the viability of silver. Supplement juices diminishes the viability of silver by a factor of no less than 80 contrasted and unadulterated water [38], and serum diminishes the movement by a factor of more than 250 [39]. In complex natural organic liquids, fixations >50 ppm [40] and as high as 60.5 ppm [41] are required. For quite a while it was believed that the antimicrobial activity of silver nitrate was because of the development of silver chloride. In any case, it was later exhibited that steady recharging of silver particles is in charge of the antibacterial action and that chloride particles really deactivated the silver particles [38]. Maybe the most

one of a kind type of silver created for wound dressings is nanocrystalline silver, which contrasts in both physical and synthetic properties from smaller scale or macrocrystalline silver and from silver salts [36]. This is, to some degree, identified with the expansion in grain limit iotas as a level of the aggregate particles in the material, which is because of the little precious stone size. These grain limits, as per Birringer [42], may speak to a third condition of strong issue. New silver-impregnated dressings, for example, ActicoatTM were intended to conquer confinements experienced with use of silver nitrate and silver sulfadiazine, specifically the need for visit applications and the fast inactivation of silver. Nanocrystalline silver items give the Ag0 type of silver which is far less quickly deactivated by chloride or natural issue than the ionic frame [34]. In these dressings, as silver is devoured by connection with target cells or inactivated by protein and anion edifices in wound liquid, extra silver is discharged, in this manner creating a managed, relentless supply of dynamic silver [34]. Nanocrystalline silver is a one of a kind structure of silver that was produced for use in wound dressings [43]. it is a meta steady, high-vitality type of basic silver arranged by physical vapor testimony receptive sputtering delivering precious stones of oxidized silver (Ag2O and Ag2CO3) and metallic silver [6,34,44]. Ordinary silver put in water won't break up, yet nanocrystalline silver disintegrates to give a focus in arrangement of around 70 ppm discharging both Ag+ and Ag0 while other silver sources discharge just Ag+ [6,36,43]. This distinction in the disintegration properties of nanocrystalline silver dressings seems to change the organic properties of the arrangement, including both antimicrobial and calming action [36]. As the particles in arrangement at the dressing wound bed interface are drained, the balance movements and more Ag+ and Ag0 particles are discharged [34]. It is however evident from the writing those nanocrystalline materials might be thermally flimsy [36].

Silver and wound infection

The utilization of topical chemotherapy is crucial to avoid contaminations in profound and shallow consumes or broad middle person consumes [1].

Progressively, anti-toxins, because of across the board unpredictable medicine, are winding up less powerful as pathogens are ending up more impervious to their activity. Silver might be a valuable prophylactic or restorative operator for the anticipation of twisted colonization by living beings that hinder recuperating, including anti-microbial safe microscopic organisms [35]. It has been a decision antibacterial for use in wound dressings and therapeutics by virtue of its recognized low danger [45]. It is a notable bactericidal operator routinely utilized as a part of clinical settings [35] and the antimicrobial action of silver particle is all around characterized. Silver is a wide range antimicrobial specialist that controls yeast, shape, and microorganisms, including methicillinresistant Staphylococcus aureus (MRSA) and vancomycinresistant enterococci (VRE), at whatever point gave at a proper fixation [28,46– 49]. As a metal, silver is moderately dormant and is ineffectively consumed by mammalian or bacterial cells. Be that as it may, within the sight of wound liquids or different emissions, it promptly ionizes and turns out to be exceptionally receptive in authoritative to proteins and cell layers [45]. Like other overwhelming metals, silver is harmful to microorganisms by harming respiratory catalysts and parts of the microbial electron transport framework and also disabling some DNA work [35,50,51]. The inhibitory activity of silver can be ascribed to its solid communication with thiol bunches show in cell respiratory catalysts in the bacterial cell. Also, silver has been appeared to interface with auxiliary proteins and specially tie with DNA bases to hinder replication [4,5]. In vitro considers gave prove that the bactericidal impact of silver is inferable to a great extent to the official of the silver particle to free sulphydryl bunches in the bacterium or on its surface prompting inactivation of the compound phosphomannose isomerase [45]. More substantive data on the bactericidal activity of silver identifies with its aggregation in the bacterial cells and its chance to interface with the cytosolic proteins, mitochondrial compounds and atomic DNA or RNA blend [45]. Alluding to the capacity of delicate microscopic organisms to retain and think Ag+ from weaken arrangements, early pharmacologists begat the term

oligodynamic [45]. At the point when consumed by microorganisms or yeast cells, the silver particle (Ag+) is deadly in delicate strains. The biocidal impacts of silver, be that as it may, are mind boggling and diverse life forms react to silver to fluctuating degrees. Confirmation from the improvement of silver-copper channels in the sanitization of clinic water frameworks proposes that silver is collected specially in delicate bacterial strains and that centralizations of 105– 107 particles for every cell are deadly [45]. The speed of activity is practically momentary once the silver achieves the microorganism. This deadly impact is expected not exclusively to the measure of silver particle introduce, yet likely additionally to the nearness of other silver radicals created by a silver discharging item or operator. It was recommended that the deadly grouping of particle in a cell was comparable to the quantity of bacterial cell compounds display [45]. Microbial imperviousness to silver itself has not been accounted for. In any case, clinically, silver safe strains of microscopic organisms are a proceeding with issue in twisted care notwithstanding many claims in the writing despite what might be expected. Truth be told, imperviousness to silver is uncommon, however not obscure. There are two types of resistance: silver can be bound by cells as an intracellular complex; and it can likewise be discharged from microorganisms utilizing cell efflux frameworks [34]. Aggregating proof shows that the bactericidal action of silver is straightforwardly identified with the measure of silver collecting inside the bacterial cell and its capacity to denature or generally disable physiological procedures [45]. It was exhibited in a lab consider that resistance was instigated utilizing low convergences of silver [52]. Bactericidal levels of silver don't deliver resistance, notwithstanding, least inhibitory fixation (MIC) (2– 4 mg Ag+/l) and sub-MIC levels can bring about the advancement of resistance. Safe cells seem to create decreased penetrability to silver consolidated with an updated dynamic efflux system to direct silver out of the cell. It is thusly evident that non-controlled utilization of silver in sublethal levels may bring about microbes creating resistance in the way that anti-infection and safe microscopic organisms have risen [10,34]. It is

significant that substances in the medium (or in the injury bed) that chelate free silver particle or accelerate it as an insoluble salt, restrain bacteriostasis. In this manner sodium chloride (as found in wound exudates) hinders the antibacterial activity of silver nitrate by hastening the silver as insoluble silver chloride. Then again, EDTA or EGTA, improve the biocidal impact of silver nitrate, potentially through chelating silver restricting substances [45]. The simultaneous development of imperviousness to anti-microbials and respectable metals, especially silver, in clinical segregates is uncommon [53,54]. Moreover, the writing does not give proof to the clinical seclusion of bacterial strains with archived cross-resistance amongst silver and anti-toxins [41,55,56]. Silver, especially in the nanocrystalline shape, gives off an impression of being a powerful methods for prophylaxis given its fast and broadspectrum adequacy. Nanocrystalline silver dressings have been exhibited in vitro as powerful antifungal operators [29], antibacterial specialists [57], and antibacterial specialists for anti-toxin safe microbes [35]. These qualities recommend that the utilization of nanocrystalline silver dressings may diminish the frequency of contaminations that defer wound recuperating when they happen [29].

Silver and wound healing

Earlier announced impacts of silver (nitrate) on consume wounds were construct fundamentally with respect to clinical investigations and perceptions. The danger of silver particles essentially has not been an issue in consume mind that has gotten much consideration [23]. Broad treatment of intense consume wounds with silver sulfadiazine (SSD), be that as it may, has as of late raised worry about potential silver lethality [25]. Research center investigations affirm that both keratinocytes and fibroblasts are vulnerable to deadly harm when presented to centralizations of silver which are deadly for microorganisms and that silver-based items can't separate between solid cells engaged with wound mending and pathogenic microscopic organisms [23]. Normally, the injury repair process includes steps that incorporate irritation

around the site of damage, angiogenesis and the improvement of granulation tissue, repair of the connective tissue and epithelium, and at last rebuilding that prompts a recuperated wound. In any case, the movement from a harmed site to a mended wound is conceivably moderated or captured by various distinctive occasions and conditions. One occasion that obstructs wound recuperating is colonization of the injury bed by microorganisms [3,58]. Notwithstanding the generation of an assortment of poisons and proteases, the nearness of microorganisms in an injury bed may likewise prompt a delayed fiery reaction. The host provocative reaction is surprisingly viable at taking out the attacking microbial populace, however that same procedure, after some time, may likewise harm the encompassing tissues [3]. The utilization of antimicrobial prophylaxis is imperative in lessening the injury's microbial load. Once an injury winds up noticeably contaminated, mending is postponed [59,60]. Expanded bacterial weight at first glance and in injured tissue builds the metabolic necessities of the injury and of the host's reaction to that substantial bacterial load. Microbes deliver endotoxins, exotoxins, proteases, and neighborhood tissue damage. The nearness of a bacterial weight in an injury invigorates a proinflammatory situation; the nearness of microbes initiates additionally movement of monocytes, macrophages, and leukocytes, all of which at first act in a proper manner however later deliver a reaction that is misrepresented and injurious. This is confirm by the way that injuries related with a substantial bacterial weight frequently demonstrate mending disappointment [27]. Bioburden might be characterized as the metabolic load forced by microscopic organisms in the injury bed. Microscopic organisms will rival ordinary cells for accessible oxygen and supplements. Moreover, microbes and bacterial items, for example, endotoxins and metalloproteinases, can cause unsettling influences in all periods of wound recuperating [27] dragging out the crippling of the patient by abating wound mending and expanding social insurance costs for the patient [61,62]. Expanded bacterial weight in an injury additionally influences tissue oxygen accessibility.

Leukocytes are required in the injury bed to execute phagocytic microorganisms by systems that include an oxydated burst and the utilization of huge measures of sub-atomic oxygen. In extremely underperfused wounds, expanded oxygen utilization by fiery cells can go about as a sump, ""taking"" oxygen required for fundamental injury digestion. What's more, the white platelets' provocative reaction expected to eliminate microscopic organisms builds the arrival of harming oxygen free radicals. The expanded generation of catalysts and the arrival of poisons can likewise encourage an initiated cell disappointment [27]. Studies bolster the idea of destroying disease to help wound mending. From a pathophysiologic angle, treating a contamination diminishes the injury's bacterial weight, which effectsly affects the flow of oxygen conveyance and usage inside the injuries. This positively impacts cell digestion. Treating contamination likewise reduces the interminable incendiary reaction, which is fundamentally degradative. At last, treating disease changes the tissue's ability to react to cell flagging and to create supported development [27]. Silver-based injury dressings are frequently used to set up the injury for recuperating and from that viewpoint silver items may have an unequivocal beneficial outcome on wound mending and might be utilized to keep up a microorganism free, clammy injury recuperating condition [27]. Other than its antimicrobial action, silver was demonstrated to have other valuable impacts on the injury bed [27]. Some of the biochemical impacts of silver on the injury have been recorded. In any case, just as of late with the new ideas on wound recuperating and mending hindrance, can an instrument of activity be exhibited. The significant concentration of wound mending has been on the connection between tissue obliteration by a gathering of collagenase chemicals known as metalloproteinases (MMP) and tissue amalgamation which is fortified by development factors. It is all around perceived that grid metalloproteinases are expected to recuperate an injury, yet abundance levels corrupt fibronectin and peptide development factors. This impact is exacerbated advance by lessened levels of tissue inhibitors of metalloproteinase (TIMPs) [27]. Silver-based advances specifically give included advantages by

down-controlling MMPs to levels that encourage wound mending [27]. The consequences of a few examinations propose that nanocrystalline silver particularly may assume a part in modifying or packing the fiery occasions in wounds and encouraging the early periods of wound recuperating. These advantages are related with decreased nearby framework metalloproteinase levels and upgraded cell apoptosis [46,63].

Wright et al. [46] noted diminished levels of framework metalloproteinases and a higher recurrence of apoptosis in a porcine model of sullied wounds treated with nanocrystalline silver affirming that silver adjusts the fiery occasions in the injury. Enclosure et al. [47] found an inhibitory impact on certain proinflammatory cytokines (tumor rot factor-alpha) too. In one investigation, zinc digestion was up directed, inferring expanded epithelialization [64,65]. Proof was given through immunocytochemical assessment of key metal-restricting metallothioneins, to demonstrate that silver actuated these proteins and upgraded the nearby convergences of zinc and copper. The two metals are fundamental micronutrients associated with epithelial cell multiplication. Expanded zinc prompting upgraded generation of RNA and DNA-synthetases, grid metalloproteinases and other fundamental proteins in the injury bed are held to add to the enhanced mending watched [45]. In other repudiating reports, it was demonstrated that silver declines surface zinc which could diminish overabundance MMP action and in such manner may expand recuperating rate since MMPs activity obviously implicated in postponing mending is subject to the accessibility of free zinc. Furthermore, silver oxidizes and ties to sulfur bonds that are vital for MMP movement. Strangely, expanded calcium levels have additionally been seen in trial wounds treated with silver. The ramifications of this are vague right now, however we do realize that calcium is a fundamental part of haemostasis as Factor IV, and that increments in calcium in the injury edge are a typical component of recuperating in intense skin wounds [45]. The strong mitigating properties of silver particle on an injury have been perceived for a considerable

length of time and have been exhibited histologically. The greater part of the reports, in any case, are simply illustrative in nature recognizing the lessening in erythema and expanded mending. It must be focused however that not all silver is calming. The calming properties rely upon the conveyance vehicle, the accessible focus and types of silver, and the length of discharge [27,28,46,47]. Expanded irritation saw with silver sulfadiazine is caused by the water solvent cream base itself. This surface irritation builds neutrophil exudate and expands protease movement on the injury surface, which might be helpful to separate surface dead tissue yet is injurious to a suitable recuperating wound bed. Then again, MMP levels in wounds treated with silver nitrate for instance soar, demonstrating a misrepresented incendiary reaction [27]. Nanocrystalline silver dressing, then again, regulates the provocative procedure at or over the level of TNF-[alpha] articulation, consequently producing a calming impact [47]. It likewise incites apoptosis, which is a mitigating procedure as in it keeps cells from experiencing rot, which is an exceptionally fiery [27,46]. In spite of its useful impacts, some unfavorable impacts of silver items on wound recuperating have likewise been depicted. Postponed wound mending is frequently watched clinically following the utilization of silver-containing topical antimicrobial operators [23,66]. Clinical trials attempted to take a gander at the impact of silver sulphadiazine on the rate of recuperating of consume wounds contrasting silver sulphadiazine with vaselinated tulle gras demonstrated that there is a reasonable postponement in the mending procedure of the silver sulphadiazine treated injuries [23]. A similar examination affected on STSG benefactor locales did not exhibit any distinction in recuperating rate [67] recommending that the watched delay in consume wound mending may not be because of re-epithelialization [23]. Deferral in eschar partition related with silver sulphadiazine treatment of profound consumes is because of the low bacterial heap of the consume wounds. Necrotic tissues are not immediately sloughed on the grounds that silver sulphadiazine delays or counteracts colonization by microorganisms.

Drawn out preservationist treatment with silver sulfadiazine, particularly in the early years significantly longer than three weeks, as a rule brings about mending with hypertrophic or atrophic scars [9,68]. Aside from the likelihood that the sloughing of dead tissue in incomplete thickness consumes is impeded, silver sulphadiazine balm may likewise back off the correct mending instruments of the injury [69]. Various unfriendly responses and symptoms have likewise been accounted for together with expanding imperviousness to silver sulphadiazine [25]. Notwithstanding unfriendly impacts of sulphonamides, delayed topical use of silver sulfadiazine cream can actuate argyria [70] despite the fact that it has never been accounted for yet because of topical application [34] with the exception of locally. Coordinate silver-incited renal harmfulness has likewise been accounted for and affirmed by high centralization of silver in blood and pee. Kidney work enhanced withdrawal of the topical cream [70]. Leukopenia has been archived also following delayed silver sulfadiazine application and could be optional to medullar danger [70]. In vitro considers demonstrated that silver sulfadiazine is cytotoxic [71] however that cytotoxicity can be diminished by controlling the conveyance of the dynamic specialist [72]. Despite the fact that other in vivo considers have discovered no confirmation for cytotoxicity [73] and in spite of the way that following quite a while of utilization, the proof for cytotoxicity is not clear and silver sulfadiazine remains the primary topical item utilized as a part of copy units [34,74], different watched poisonous impacts affirm that this topical cream ought not be utilized for long stretches on broad injuries [70]. Bacterial colonization of wounds may postpone wound mending. Present day silver-containing dressings are antimicrobial, yet cell poisonous quality is a genuine symptom [75]. In spite of the fact that it has been accounted for generally that silver has a low mammalian cell lethality [28,46,47,76], silver particle has coordinate cytotoxic impacts on different mammalian cells. Cytotoxicity of bond stacked with silver salts made this sort of silver inadmissible for clinical use in the past [77]. Silver nitrate in vitro has been appeared to negatively affect fibroblasts [78], hepatocytes [79] and lymphocytes. Concentrates on

anodically created silver particles, in any case, did not show any cytotoxic impact on mammalian cells in culture and no tissue poisonous quality could be controlled by clinical assessments [80,81]. Despite the fact that it was asserted in before reports that nanosilver was free of in vitro cytotoxicity and indicated high adequacy against multi-safe microscopic organisms [77] it was later revealed that high centralizations of nano-silver base inorganic antibacterial operators effectsly affected rodent fibroblasts. Cytotoxicity was specifically relative to the silver focus. Low silver particle discharge rate may forestall obstruction with wound-recuperating systems [75]. No cytotoxic impacts were seen at or beneath the centralization of 25 g/l [21]. In another investigation to assess the intense dangerous impacts of metal/metal oxide nanoparticles on in vitro rodent liver inferred cell line (BRL 3A), mitochondrial work diminished signifi-cantly in cells presented to Ag nanoparticles at 5– 50 mg/ml presuming that the Ag was profoundly poisonous. Because of this showed poisonous quality of silver, additionally consider led with reference to its oxidative anxiety displayed huge consumption of glutathione (GSH), diminished mitochondrial layer potential, and expanded receptive oxygen species (ROS), which recommended that cytotoxicity of Ag (15, 100 nm) in liver cells is probably going to be interceded through oxidative anxiety [18]. The impacts of various sorts of nanoparticles on gametogenesis were assessed in another examination by light microscopy, and by cell multiplication and standard cytotoxicity measures. Results exhibited a focus subordinate lethality for a wide range of particles tried, though the relating dissolvable salts had no noteworthy impact. Silver nanoparticles were the most dangerous [19]. All the more clinically arranged investigations testing the impact of Acticoat Burn Dressing (Acticoat; Westaim Biomedical, Exeter, NH), a silver-covered hindrance dressing, on refined skin substitutes (CSS) demonstrated that presentation in vitro of CSS to Acticoat was cytotoxic inside 1 day. Notwithstanding, 1 week of presentation in vivo did not harm CSS or repress wound recuperating [82]. Another investigation measuring the inhibitory impact of the nanocrystalline silver on keratinocyte development inferred that

Acticoat is cytotoxic to refined keratinocytes and ought not be connected as a topical dressing on refined skin unites [20]. Acticoat likewise appeared to explicitly hinder re-epithelialization [14]. Silver keratinocyte cytotoxicity was perceived in Moyer's unique report [83]. Epithelial recovery has all the earmarks of being restrained when the convergence of AgNO3 surpasses 1% which is the reason it was prescribed to persistently wet silver nitrate dressings with 0.5% AgNO3 at 2-h interims to anticipate increment in centralization of the AgNO3 to scathing focuses (over 2%) through drying [11]. Exploratory examination on wound mending viability as assessed in an incomplete thickness consume mouse show secured by keratinocyte societies proposes likewise that epidermal development factor (EGF) is a helpful operator in the impediment of wound recuperating caused by silver sulfadiazine (Ag-SD) [17]. However in another examination, different silver dressings were connected to the focal point of culture plates that were then seeded with keratinocytes at an expected 25% intersection. Impacts of Silvazine (Sigma Pharmaceuticals, Melbourne, Australia) 1% silver sulphadiazine (Flamazine (Smith and Nephew Healthcare, Hull, UK)) and a silver-based dressing (Acticoat (Smith and Nephew Healthcare, Hull, UK)) were looked at. In this in-vitro consider Silvazine was observed to be the most cytotoxic operator. Seventytwo hour presentation to Silvazine in that review brought about no keratinocyte survival at all and a profoundly measurably noteworthy decrease in cell survival in respect to control, Acticoat and Flamazine ($P < 0.001$, $P < 0.01$, $P < 0.01$, separately). Flamazine is related with a factually noteworthy decrease in cell numbers in respect to control ($P < 0.05$), however is significantly less cytotoxic than Silvazine ($P < 0.005$) [2]. Impacts of joining antimicrobial silver-zeolite on the in vitro cytotoxicity of five tissue conditioners against the living dermal model, which comprised of typical human dermal fibroblasts in a collagen cross section, were likewise assessed. The outcomes propose that the most elevated cell reasonability is seen with the littlest silver-zeolite focus [22], demonstrating by and by that regardless of the type of silver conveyance, its cytotoxicity is specifically corresponding to its fixation. Ingestion of silver

from wound care items and dressings by cells of the injury edge is not reported in most clinical investigations [45]. In the injury bed, silver particle is naturally dynamic and enthusiastically joins with proteins, cell surface receptors (and sulphydryl gatherings) and wound flotsam and jetsam [45].

We do know additionally through trial and clinical work, that silver saturating into the injury bed is taken up by epidermal cells at the injury edge and is amassed in the injury flotsam and jetsam and goes into the fringe course to be saved in the liver and kidney, with some voided in the pee [45]. Concentrates worried about the assimilation of silver from fractional and full-thickness consume wounds (5% body surface range) demonstrated that the majority of the silver is related with the shallow eschar and next to no is ingested into more profound layers [84,85]. Rather than these discoveries, Wang et al. [86], Boosalis et al. [87], and Sano et al. [88] showed noteworthy ingestion of silver from expansive consume wounds (40% body surface territory) treated topically with silver sulfadiazine, so there is the likelihood of silver poisonous quality happening [84]. There are not very many reports in the writing of silver poisonous quality regardless of vast exposures to silver in the treatment of consume wounds [34]. Argyria, a lasting issue caused by silver affidavit in the skin's smaller scale vessels in patients who are presented to interminable silver lethality [89,90], is just observed after substantial oral or breathed in admissions of silver clean or colloidal silver over an expanded timeframe and has never been accounted for because of topical application [34]. Transient skin staining identified with the intensely lifted blood silver levels has as of late been depicted after the utilization of nano crystalline silver for nearby treatment of 30% TBSA consume [25]. Liver capacity variations from the norm have likewise been watched following intense silver harmfulness due to nano crystalline silver [25]. Silver danger in the cerebrum delivering headstrong myoclonic status epilepticus has likewise been accounted for following ingestion of colloidal silver [7]. No confirmation has been given so far to demonstrate that silver impacts the immuno-stifled state regularly found in

consumes [45]. Notwithstanding, unfavorably susceptible reactions to silver have once in a while been noted [34] influencing a little extent of patients treated with topical silver nitrate. Despite the fact that not particularly recognized up until now, the likelihood of unfavorably susceptible responses emerging using more up to date silver injury medicines ought to be considered, and may demonstrate a contraindication for their utilization in a few patients. Different intricacies including leucopenia, bone marrow lethality and renal or hepatic harm through silver testimony, as observed once in a while with silver nitrate of silver sulphadiazine, are probably going to be of peripheral noteworthiness [45].

Burn wounds are related with a high occurrence of death and inability. Advances in cell science, and learning in wound recuperating and development factors, have pushed ventures toward consume administration. Split-thickness skin uniting with autografts is the standard of care. Honey was utilized for administration of consumes and the utilization of Honey for consumes has been reviewed[113,114,115,116,117,118]. Different modalities have been evaluated, including Honey, human amnion, xenograft, allograft, refined epithelial autograft, and different built business items, for use in the biologic treatment of consume wounds[116]. An efficient survey and meta-examination of randomized controlled trials that contrasted the adequacy of Honey and a comparator dressing treatment in the administration of consumes was directed. Eight investigations with 624 subjects were incorporated. It was discovered that in many examinations, Honey secured by sterile cloth was contrasted and silver sulfadiazine– impregnated bandage. The settled impacts chances proportion for recuperating at 15 days was 6.1 (95% CI 3.7– 9.9) for Honey having an unrivaled impact. The optional result factors all indicated fundamentally more prominent adequacy for Honey treatment. It was reasoned that accessible confirmation demonstrates extraordinarily more noteworthy viability of Honey contrasted and elective dressing medications for shallow or incomplete thickness burns[118].

In the U.K., an audit ponder planned to examine topical Honey for shallow consumes through an efficient survey of randomized controlled trials. Five investigations in patients with incomplete thickness or shallow consumes including <40% of the body surface were checked on. Comparators were polyurethane film, amniotic layer, potato peel, and silver sulfadiazine. The number expected to treat for 7 days with Honey to deliver one patient with a mended consume was 2.6 (2.1– 3.4) contrasted and some other treatment, and 2.7 (2.0– 4.1) contrasted and potato peel and amniotic layer. For a large portion of the results, Honey was better than every single other treatment. Furthermore, time for mending was altogether shorter for Honey than other treatments[117]. In France, it was discovered that mending was quick for first-and second-degree burns[119]. Honey created constriction of irritation and exudation, in addition to fast recovery of external epithelial tissue and cicatrization. In the Netherlands, Honey treated consumes indicated less aggravation than those treated with sugar and silver sulfadiazine[120].

In Malaysia, full-thickness consume wounds made on the dorsum of 36 rats were immunized with P. aeruginosa, K. pneumoniae, or Acinetobacter baumannii. The injuries were dressed with tualang Honey, hydrofiber, and hydrofiber silver. Results demonstrated that there was a fast lessening in twisted size by day 6 in the tualang honey– treated injuries. Tualang honey–treated rats exhibited a decrease in bacterial development in P. aeruginosa–immunized injuries. Be that as it may, hydrofiber silver– and hydrofiber-treated injuries are better than Honey treated injuries with A. baumannii[121]. Antibacterial action of Aquacel-tualang Honey, Aquacel-manuka Honey, Aquacel-Ag, and Aquacel-plain dressings against microscopic organisms segregated from consume patients were tried in vitro. Seven creatures were disconnected: Enterobacter cloacae, K. pneumoniae, Pseudomonas spp., Acinetobacter spp., S. aureus, coagulase-negative S. aureus, and Streptococcus spp. Aquacel-Ag and Aquacel-manuka Honey dressings gave a superior zone

of restraint for Gram-positive microscopic organisms contrasted with the Aquacel-tualang Honey dressing. In any case, tantamount outcomes were gotten against Gram-negative microbes tried with Aquacel-manuka Honey and Aquacel-tualang Honey dressings. Tualang Honey has a bactericidal and bacteriostatic effect[122].

In Pakistan, in a randomized, relative clinical trial, the adequacy of Honey for the treatment of shallow and halfway thickness consumes covering <40% of body surface range was assessed in 150 patients and contrasted its outcomes and those of silver sulfadiazine. The rate of re-epithelialization and recuperating of shallow and incomplete thickness consumes was fundamentally quicker in the destinations treated with Honey than in the locales treated with silver sulfadiazine. Six patients had positive culture for P. aeruginosa in the Honey treated site, while 27 patients had positive culture in the silver sulfadiazine– treated site[123].

Another examination was completed in Iran to think about the impact of Honey and mafenide acetic acid derivation on auricular consume in rabbits. Results demonstrated that in spite of the fact that the pathologic score of the Honey aggregate was superior to that of the mafenide gathering, both on 14 and 21 days in the wake of consuming, it was not factually critical. In the mafenide acetic acid derivation gathering, profound inconvenience of consume (chondritis) was altogether lower than that of the Honey group[124].

In Turkey, an investigation assessed Honey use for the split-thickness skin unite obsession on account of its cement and other helpful impacts in 11 patients. No entanglements, for example, join misfortune, disease, or unite dismissal, were reported[125].

In India, a forthcoming, randomized clinical investigation to contrast Honey impregnated bandage and amniotic layer dressing in incomplete thickness

consumes was performed. Sixty-four patients were examined; 40 were treated with Honey impregnated dressing and 24 were treated with amniotic film. The consumes regarded with Honey recuperated before when contrasted with those treated with the amniotic layer (mean 9.4 versus 17.5 days). Leftover scars were noted in 8% of patients treated with Honey impregnated cloth and in 16.6% of cases treated with amniotic membrane[126]. In another examination, 104 instances of shallow consume damage were regarded with Honey as a dressing or with silver sulfadiazine bandage dressing. In the 52 patients treated with Honey, 91% of wounds were rendered sterile inside 7 days. In the 52 patients treated with silver sulfadiazine, 7% demonstrated control of disease inside 7 days. Also, sound granulation tissue was watched before in patients treated with Honey, and of the injuries treated with Honey, 87% recuperated inside 15 days when contrasted with 10% in the control group[113]. In India, the impact of Honey dressing and silver sulfadiazine dressing on twisted mending in consume patients was examined in 78 patients with first-and severely charred areas of <50% of aggregate body surface region.

Honey dressings enhanced injury mending, made the injury sterile in less time, had a superior result as far as aversion of hypertrophic scarring and postburn contractures, and diminished the need of debridement regardless of time of confirmation, when contrasted with silver sulfadiazine dressings[127].

Twenty-five patients with consumes were haphazardly distributed for treatment with Honey or silver sulfadiazine. Of the injuries treated with Honey, 84% indicated acceptable epithelialization by the seventh day and 100% of the patients by the 21st day. Likewise, in Honey dressed injuries, early subsidence of intense incendiary changes, better control of contamination, and speedier injury recuperating was observed[38]. Honey impregnated cloth was contrasted and OpSite™ as a cover for crisp, incomplete thickness consumes in two gatherings of 46 arbitrarily dispensed patients. Results demonstrated that

injuries dressed with Honey impregnated cloth indicated before mending as contrasted those dressed and OpSite[127].

Honey has been utilized for its mending properties for a considerable length of time and has been utilized to dress injuries with promising outcomes. Honey dressings increment mending, limit debridement, incite effective join, evacuate dry outside, avoid dry scab development on consumes, wash down injuries, ease division of quagmires, freshen up wounds, cause calming of wounds, and limit scar formation[33,38,41,73,75, 126,127,128,129,130,131]. Honey dressings are anything but difficult to apply and remove [73,128,129,130,131,132]. The utilization of Honey as an injury dressing was checked on recently [133].

Honey has antibacterial movement and, therefore, it is viable in treating tainted wounds[43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,76,77,132,134,135,136,137,138,139,140,141,142,143,144,145,146,147,148,149,150]. Clinical investigations on the utilization of Honey as a dressing for contaminated injuries report that the injuries end up plainly cleaned in 3– 10 days [100,101,102]. Al-Waili and Salom have utilized Honey dressings for treatment of postoperative cesarean area wound infections[68]. Honey connected to the injuries in the wake of washing with typical saline and secured with dry cloth lessened recuperating time and doctor's facility stay, advanced quick annihilation of bacterial disease, averted wound dehiscence, and caused insignificant scar arrangement. Honey could go about as an obstruction, which would avoid wound infection [38,72,132]. In clinical practice, Honey is spread on the injury, at that point secured with dry gauze [38,69,75]. If there should be an occurrence of canker or necrotic tissue, Honey is connected after seepage of ulcer or expulsion of necrotic tissues [33,151].

MATERIAL AND METHODS:

Type of Study: Prospective Observational

Study Design: Cross Sectional Study

Study Population:

- **Age:** more than 18 years
- **Gender:** Both male & female

Study Duration:12 Months

Study Centre: Department of Surgery, Dhiraj General Hospital

Study Sample Size: In present study we have enrolled total 40 patients.

Inclusion Criteria:

- All the patients referred to or admitted under the departments of general Surgery and diagnosed to have chronic wound either infected or burns.

Exclusion criteria:

- Patient not willing for study.
- Patient with immunocompromised status, comorbid factors like cardiac / respiratory diseases, organ failure and on chemotherapy were excluded.

METHOD OF COLLECTION OF DATA:

All the patient presenting with chronic wound in surgery outpatient department or casualty were screened for the study and then study related procedure were explained to them by the investigator in presence of LAR and impartial witness

if required and gave sufficient time to patient and relative to understand the procedure then after if patient and LAR gave consent to participate in the study then only we enrolled the patient in the study. After enrolling the patient in the study all details of them were taken.

On admission history was collected and thorough physical examination done. Datacollection on admission included age, sex, address and clinical presentation withrespect to site /size/ onset duration and progress of wound. History of probableaetiology with respect to trauma, diabetes, tuberculosis, varicose veins will benoted.

History of previous episodes and co-morbidities was noted.Clinical examination of wound/ulcer was done as described in Proforma. Routine investigations like complete hemogram, Blood urea, and Random blood sugar were performed.

The treatment plan was focused on adequate control of infections and control of blood sugar. Wound debridement if required to be done followed by closed dressing with honey / Silver Sulfadiazine and gauze pad. Serial dressing of the wound was done and healing of the wound in the form of granulation tissue formation, reduction in the size of wound, contraction of the wound and time taken was noted every 2 weeks. Data like clinical symptoms and signs, results of investigations, complications, surgical procedures if any, duration of hospital stay was recorded.

STATISTICAL PLAN

SPSS 20 was used for statistical analysis of this study data.

In this study we have calculated frequencies and percentage for qualitative data The Statistical Package for the Social Sciences (SPSS 20) is the software used.

The analysis is stratified by outcome to observe differences in patients of peritonitis. The linear relationships of each screening method are assessed using the partial correlations function.

Significance for each analysis is set at a p-value of 0.05, and p-values <0.01 for highly significant findings.

Pearson's Chi Square test was used to find significant significance in the study subjects

PROFORMA:

1	Name:	
2	Reg. No.:	
3	Age/Sex:	
4	Ward:	
5	Address:	
6	Date of Admission:	
7	Date of Discharge:	
8	Clinical History	

PRESENT COMPLAINTS

Non-healing ulcer/ burns.	
History of diabetes/ trauma/ varicose veins/ tuberculosis/ immunocompromised status	
History of previous surgery	

PAST HISTORY

- H/O Similar complaints / DM / HT / Trauma / Dietary Habits / Addiction.

CLINICAL EXAMINATION

- Vitals
  - General Condition
  - B.P
  - Pulse
  - Temperature
  - Respiratory Rate
- Pallor / Icterus / Cyanosis / Clubbing / Oedema / Lymphadenopathy
- System Review
  - RS
  - CVS
  - CNS
  - Per Abdomen
- Local examination:

- Inspection:
  - Size
  - Shape
  - Situation
  - Extent
  - Edge
  - Margin
  - Floor
  - Surrounding Area
- Palpation:
  - Size
  - Shape
  - Situation
  - Extent
  - Edge

- Margins
- Base
- Surrounding Area
- Peripheral pulsations (in limb wound)

INVESTIGATIONS

- CBC
- RFT
- Serum Electrolytes
- Blood group & Rh
- HbsAg
- HIV
- Urine : Routine & Microscopy
- ECG
- Radiological
    - X-ray
        - Chest
        - Local Part

FINAL DIAGNOSIS:

Debridement of wound, antibiotics to control infection, Control of diabetes.

Daily dressing of wound by cleaning with normal saline and applying honey over the wound and closed dressing with gauze and bandages.

Raw area after formation of healthy granulation tissue to be covered by Skin graft.

OUTCOME:

- Immediate: in the form of healing of chronic wound.
- On discharge: completely covered wound.
- Mortality

FOLLOW UP: minimum follow up of 6 months was kept.

MANAGEMENT:

HONEY DRSSING/ SILVER SULFADIAZINE:

INITIAL SIZE	DEBRIDEMENT	NUMBER OF DAYS REQUIRED FOR HEALTHY GRANULATION TISSUE	CONTRACTION OF WOUND SIZE	STG / PROMARY INTENSION	HOSPITAL STAY	AMPUTATION REQUIREMENT

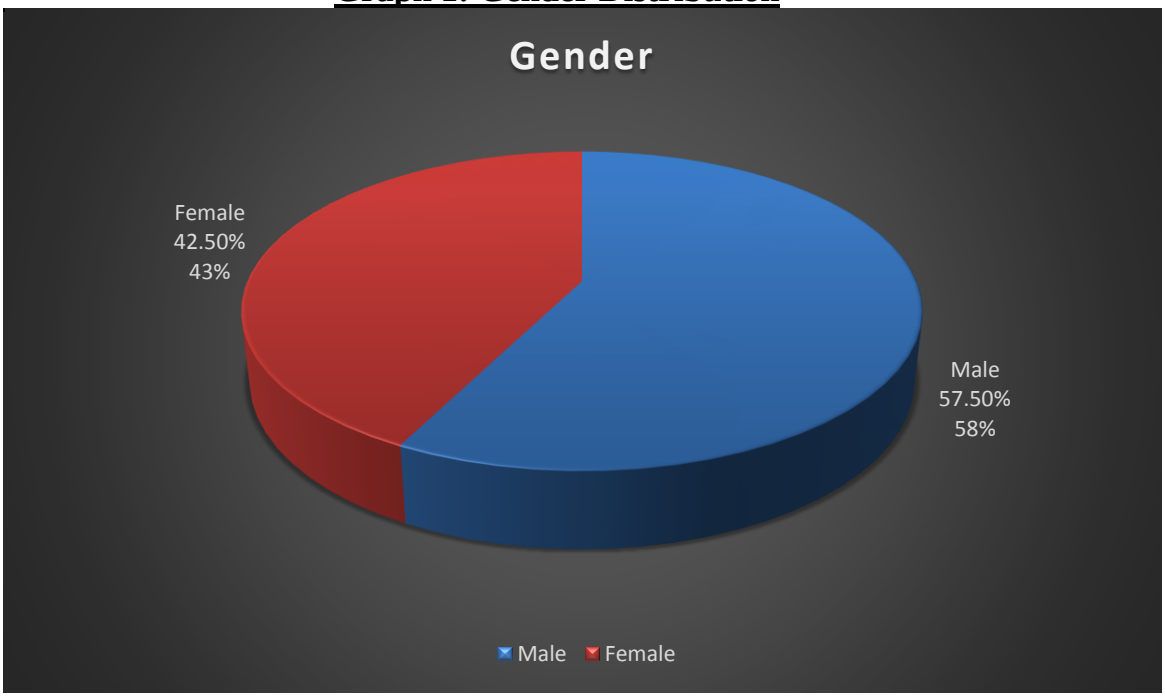
RESULTS:

1. GENDER DISTRIBUTION:

Table 1: Gender Distribution

Gender	N	%
Male	23	57.50%
Female	17	42.50%
Total	**40**	**100.00%**

Graph 1: Gender Distribution



In the present study, we have enrolled total 40 patients who were presented with chronic wound at the department of Surgery, Dhiraj General Hospital, Sumandeep Vidyapeeth.

Out of total 40 patients 57.50 % were male and 42.50% were female and all the patients were divided into two groups i.e. Honey group and SSD group.

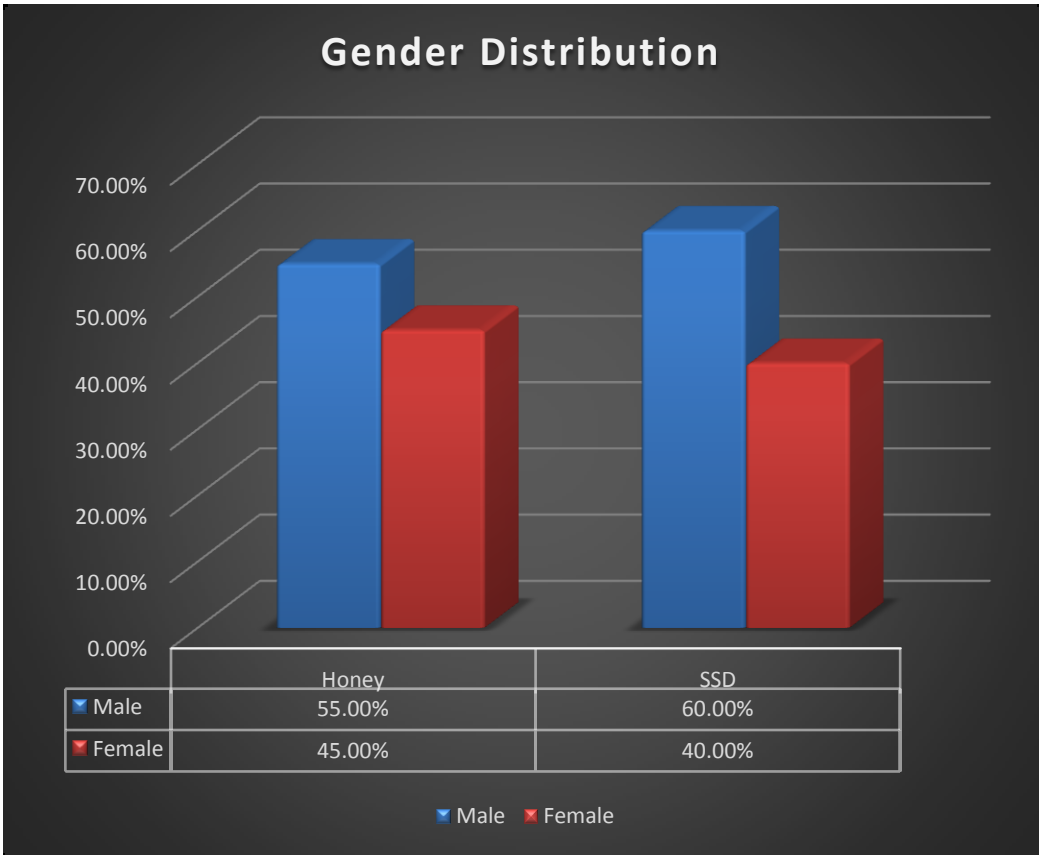
Allocation of the group was done randomly.

2. GENDER DISTRIBUTION IN BOTH GROUPS:

Table 2: Gender Distribution in Both Groups

Gender	Honey	%	SSD	%
Male	11	55.00%	12	60.00%
Female	9	45.00%	8	40.00%
Total	**20**	**100.00%**	**20**	**100.00%**

Graph 2: Gender Distribution in Both Groups



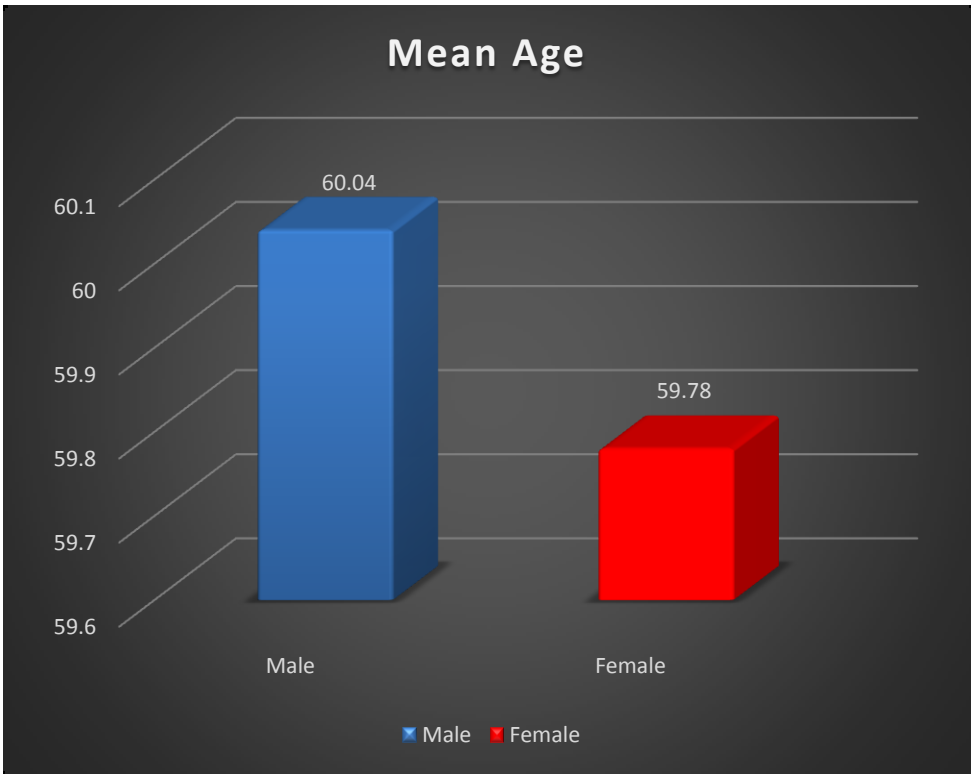
We have distributed all patients in two groups i.e. Honey group and SSD group. We have found that in Honey group 55.00% were male and 45.00% were female whereas in SSD group 60.00% were male and 40.00% were female.

3. MEAN AGE OF PARTICIPANTS:

Table 3: Mean Age of Participants

Gender	Mean Age	SD
Male	60.04	9.45
Female	59.78	10.34
Total	**59.91**	**9.89**

Graph 3: Mean Age of Participants



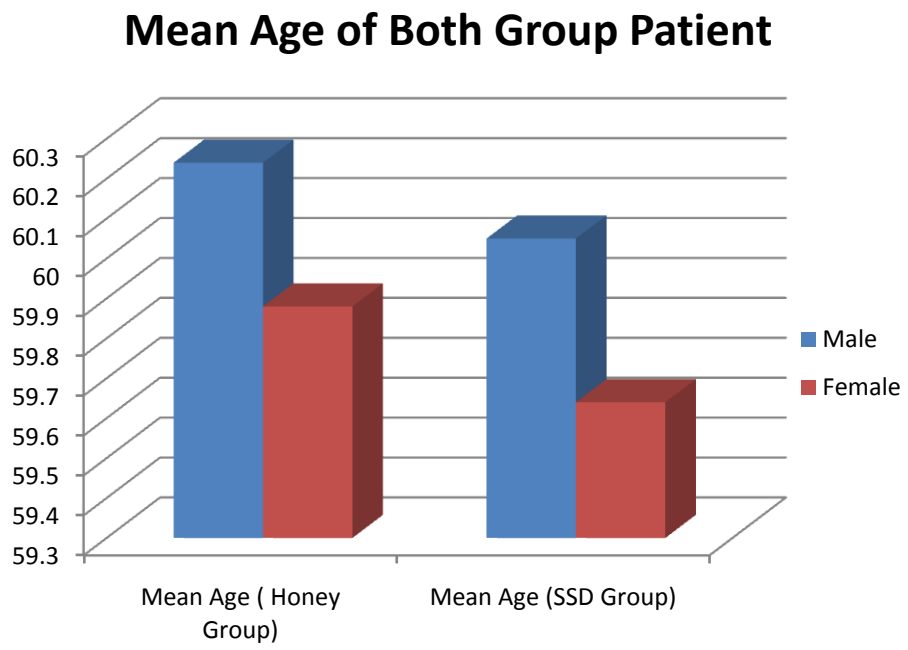
From above table and graph it has been seen that mean age of all the enrolled participants was 59.91 ± 9.89 years where as when we calculated mean age for both gender than we have found that mean age for male patient was 60.04±9.45 years and mean age for female participants was 59.78±10.34 years. So it has been seen that mean age of male participant was comparatively more than female participants.

4. MEAN AGE OF PARTICIPANTS:

Table 4: Mean Age of Participants

Gender	Mean Age (Honey Group)	SD	Mean Age (SSD Group)	SD
Male	60.24	11.25	60.05	8.78
Female	59.88	12.44	59.64	9.61

Graph 4: Mean Age of Participants



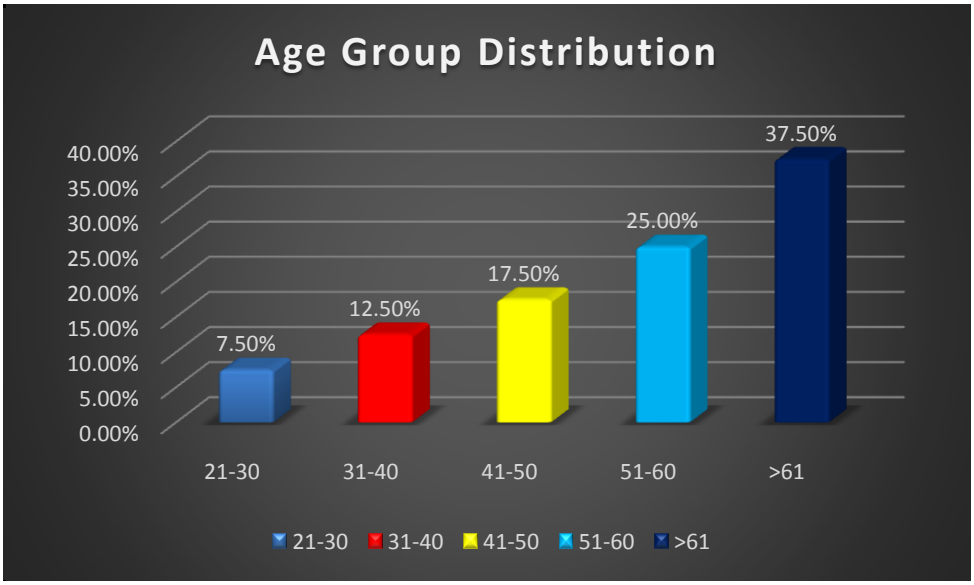
From above table and graph it has been seen that mean age for both gender than we have found that mean age for male patient in honey group was 60.24±11.25 years and mean age for female participants was 59.88±12.44 years. And in SSD group we have found that mean age for male patient in honey group was 60.05±8.78 years and mean age for female participants was 59.64±9.61 years. .

5. AGE DISTRIBUTION:

Table 5: Age Distribution

Age Distribution	N	%
21-30	3	7.50%
31-40	5	12.50%
41-50	7	17.50%
51-60	10	25.00%
>61	15	37.50%
Total	**40**	**100.00%**

Graph 5: Age Distribution

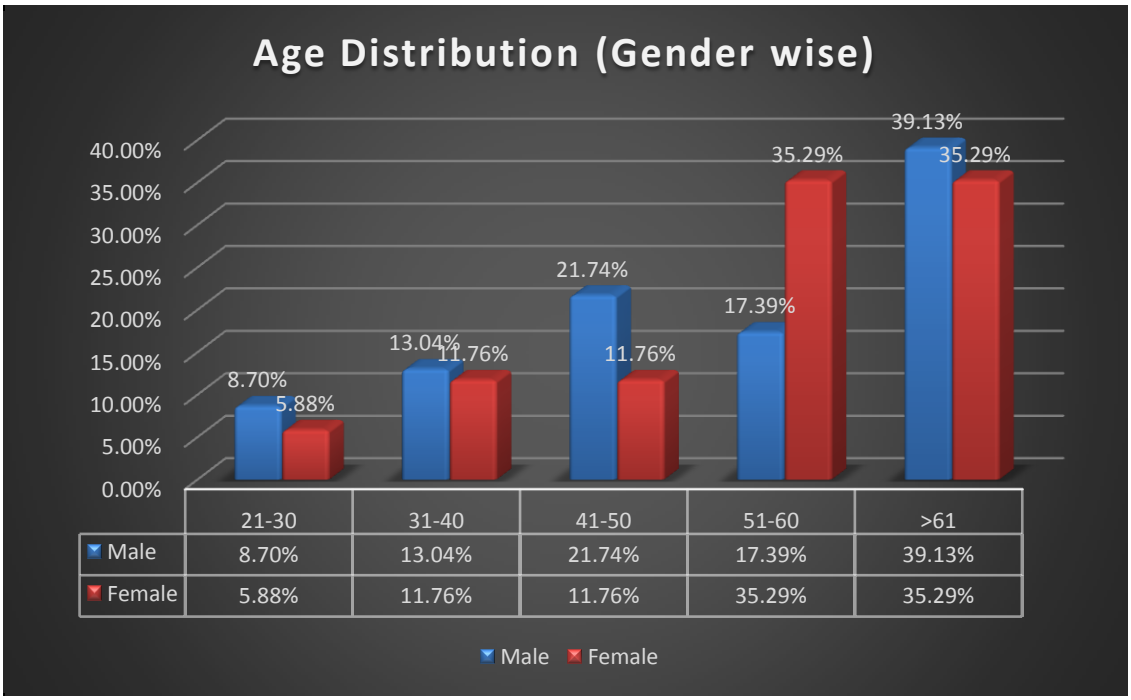


In present study we have divided patients in five age groups. i.e 21-30 year, 31-40 years, 41-50 years, 51-60 years and >60 years and we have found that majority of the patients were fall in age group of more than 61 years (37.50 %), followed by 51-60 years (25.00%), 41-50 years (17.50%), 31-40 years (12.50%) and 21-30 years (7.50%).

Table 6: Age Distribution (Gender wise)

Age Distribution	Male	%	Female	%
21-30	2	8.70%	1	5.88%
31-40	3	13.04%	2	11.76%
41-50	5	21.74%	2	11.76%
51-60	4	17.39%	6	35.29%
>61	9	39.13%	6	35.29%
Total	**23**	**100.00%**	**17**	**100.00%**

Graph 6: Age Distribution (Gender wise)



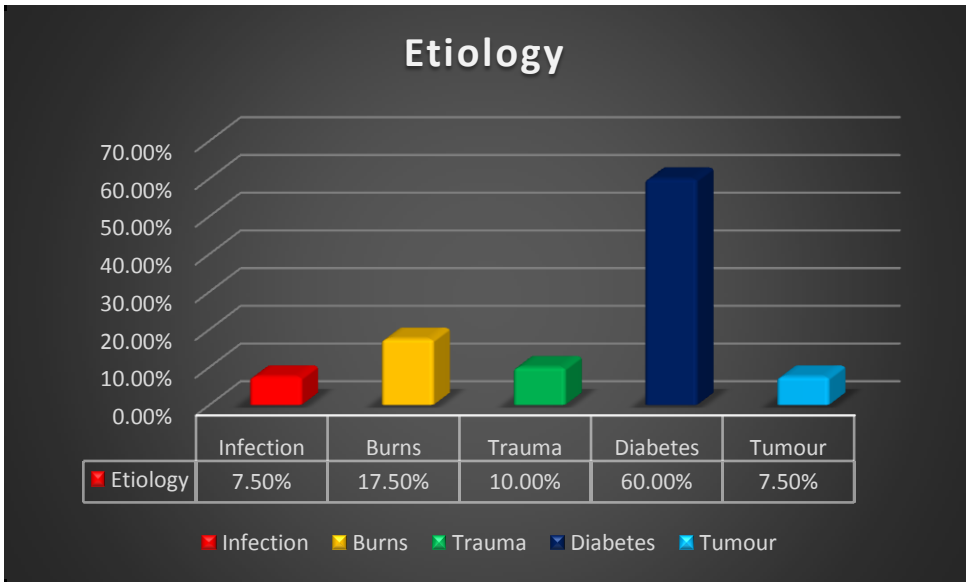
As per table 3 in table 4, both group similarly higher number in higher age group and simultaneously number of patients were decreasing in young age group compare to elder age group.

6. ETIOLOGY:

Table 7: Etiology

Etiology	N	%
Infection	3	7.50%
Burns	7	17.50%
Trauma	4	10.00%
Diabetes	24	60.00%
Tumor	3	7.50%

Graph 7: Etiology



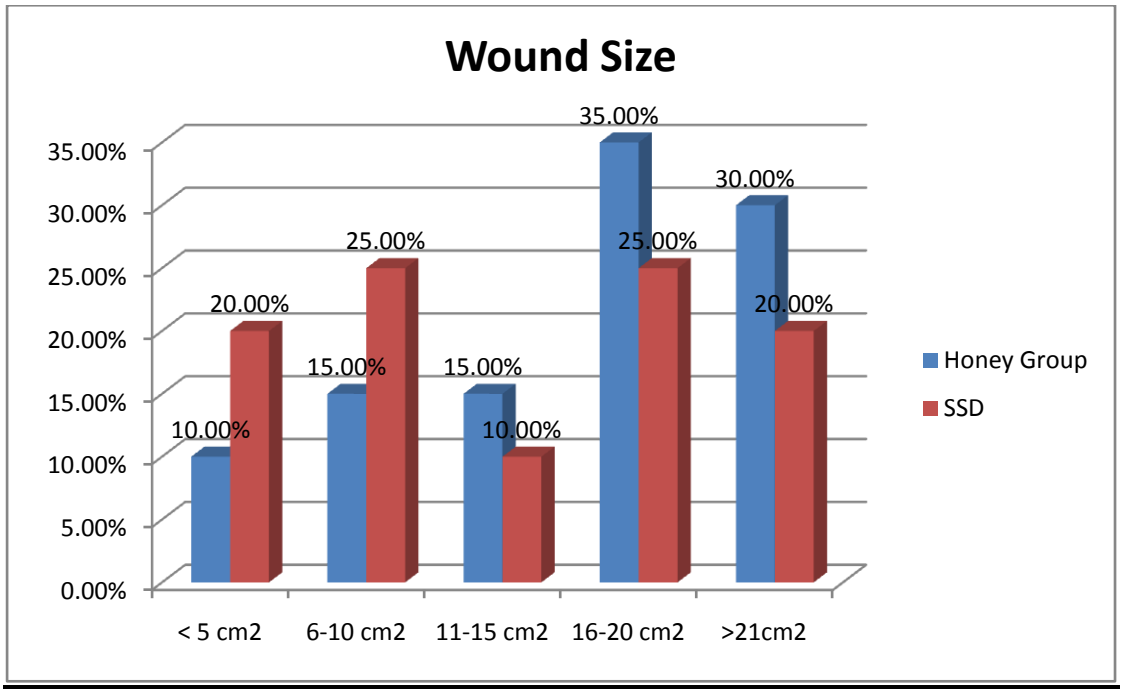
In present study, we have found that most of the patients had history of diabetes (60.00%) followed by burns, Infection and tumors.

7. Wound Size

Table 8: Wound Size

Wound Size	Honey Group	%	SSD	%	Total
< 5 cm^2	2	10.00%	4	20.00%	6
6-10 cm^2	3	15.00%	5	25.00%	8
11-15 cm^2	3	15.00%	2	10.00%	4
16-20 cm^2	7	35.00%	5	25.00%	12
>21cm^2	6	30.00%	4	20.00%	10

Graph 8: Wound Size



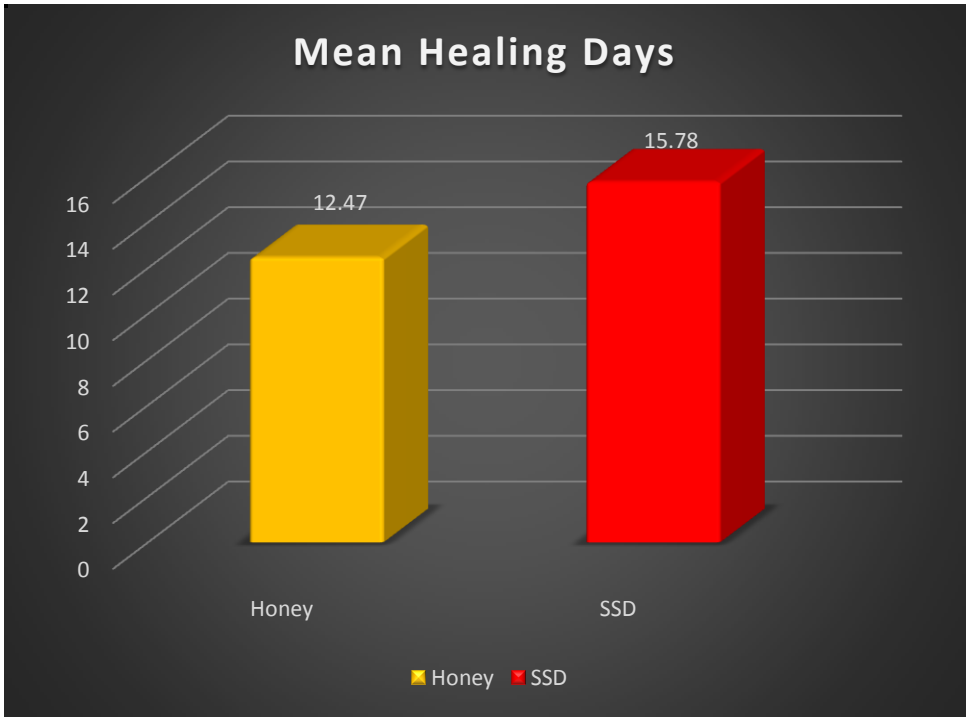
In present study, we have found that most of the patients had wound size more than 16 cm^2 (65.00% in honey group vs. 45.00% in SSD Group) compare to < 16 cm^2

8. MEAN HEALING DAYS:

Table 9: Mean Healing Days

Group	Mean Healing Days	SD	P Value
Honey	12.47	4.15	0.000
SSD	15.78	5.78	
Total	**14.12**	**4.96**	

Graph 9: Mean Healing Days



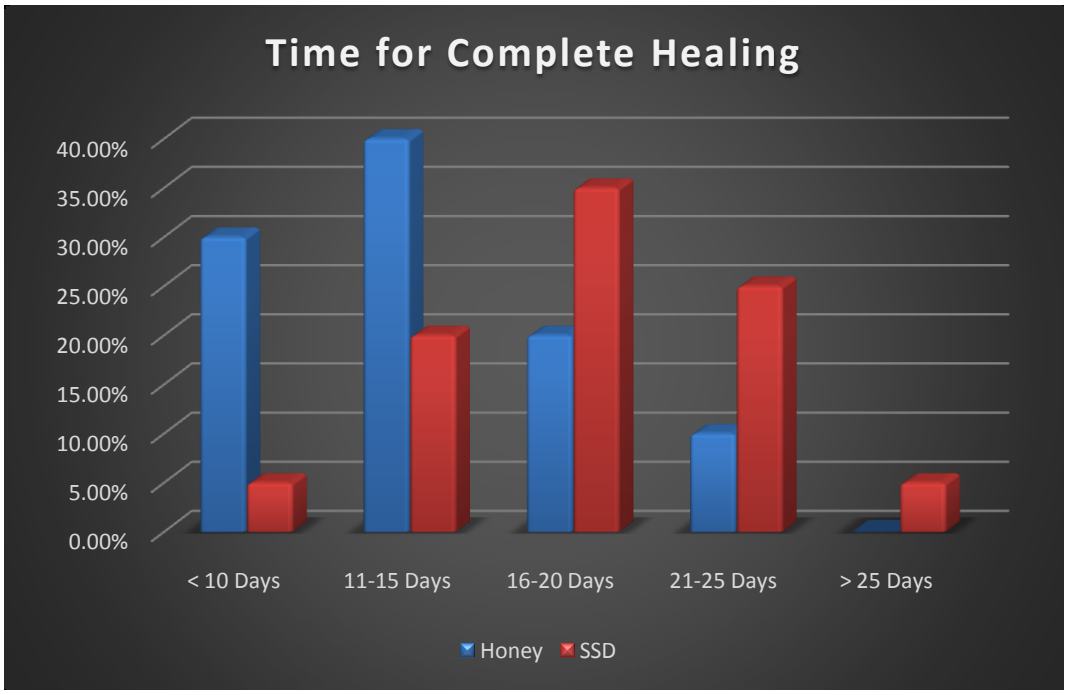
In present study we have compare the mean healing days required in both groups by using independent t test and found that mean healing days was significantly less in honey group compare to mean healing days required in SSD group, i.e. 12.47±4.15 vs. 15.78±5.78. We found p value was 0.000 which is highly significant.

9. TIME FOR COMPLETE HEALING:

Table 10: Time for Complete Healing

Time for Compete Healing	Honey	%	SSD	%	p value
< 10 Days	6	30.00%	1	5.00%	
11-15 Days	8	40.00%	4	20.00%	
16-20 Days	4	20.00%	7	35.00%	**0.000**
21-25 Days	2	10.00%	5	25.00%	
> 25 Days	0	0.00%	1	5.00%	

Graph 10: Time for Complete Healing



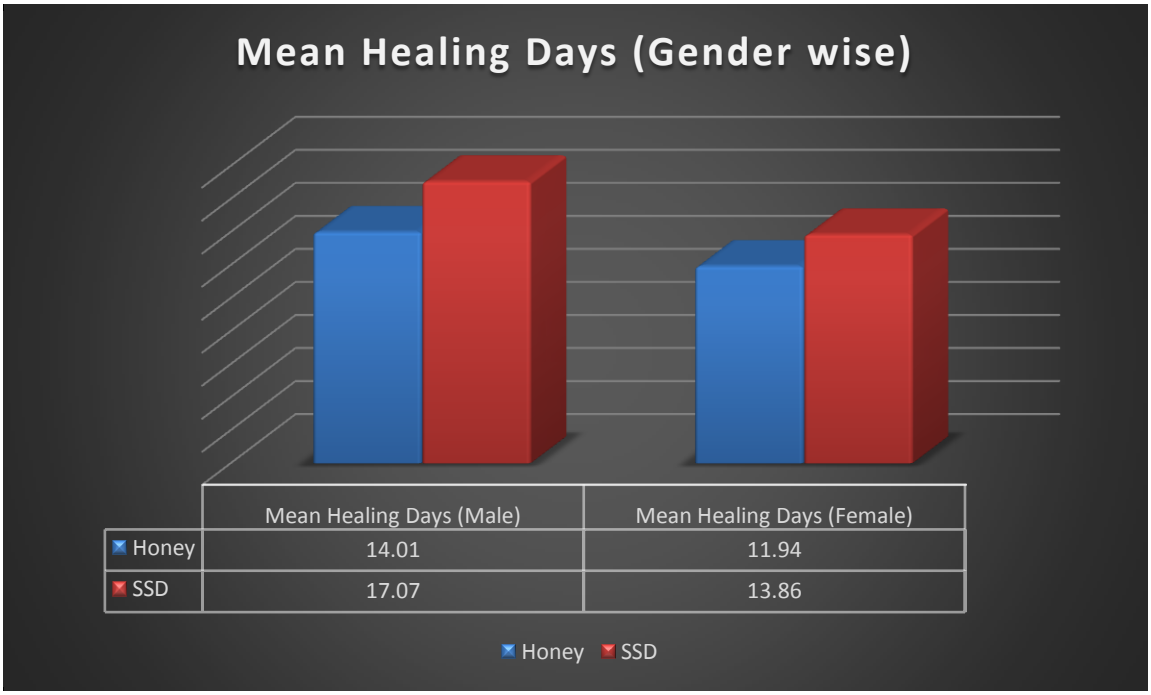
We have compare both honey and SSD group to assess in which group more patients required less number of days for healing and we have found that in honey group more number of patients required less number of days for healing compare to SSD group and this result is statistically significant, p = 0.000

10.MEAN HEALING TIME (GENDER WISE):

Table 11: Mean Healing Time (Gender wise):

Group	Mean Healing Days (Male)	SD	Mean Healing Days (Female)	SD	p value
Honey	14.01	3.12	11.94	5.14	**0.000**
SSD	17.07	4.56	13.86	3.45	**0.000**

Graph 11: Mean Healing Time(Gender wise):



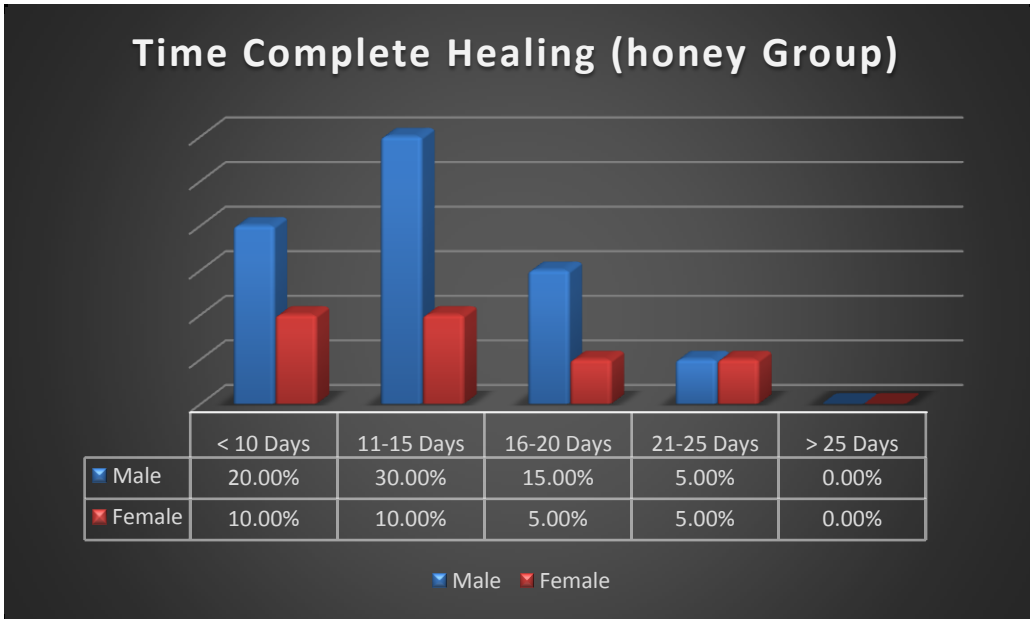
In present study we have compare the mean healing days required in both genders by using independent t test and found that mean healing days was significantly less in female patients compare to mean healing days required in male patients in both Honey and SSD groups, We found p value was 0.000 which is highly significant.

11. TIME COMPLETE HEALING GENDER WISE (HONEY GROUP)

Table 12: Time Complete Healing Gender wise (Honey Group)

Time for Compete Healing (Honey Group)	Male	%	Female	%	p value
< 10 Days	4	20.00%	2	10.00%	
11-15 Days	6	30.00%	2	10.00%	
16-20 Days	3	15.00%	1	5.00%	**0.004**
21-25 Days	1	5.00%	1	5.00%	
> 25 Days	0	0.00%	0	0.00%	

Graph 12: Time Complete Healing Gender wise (Honey Group)



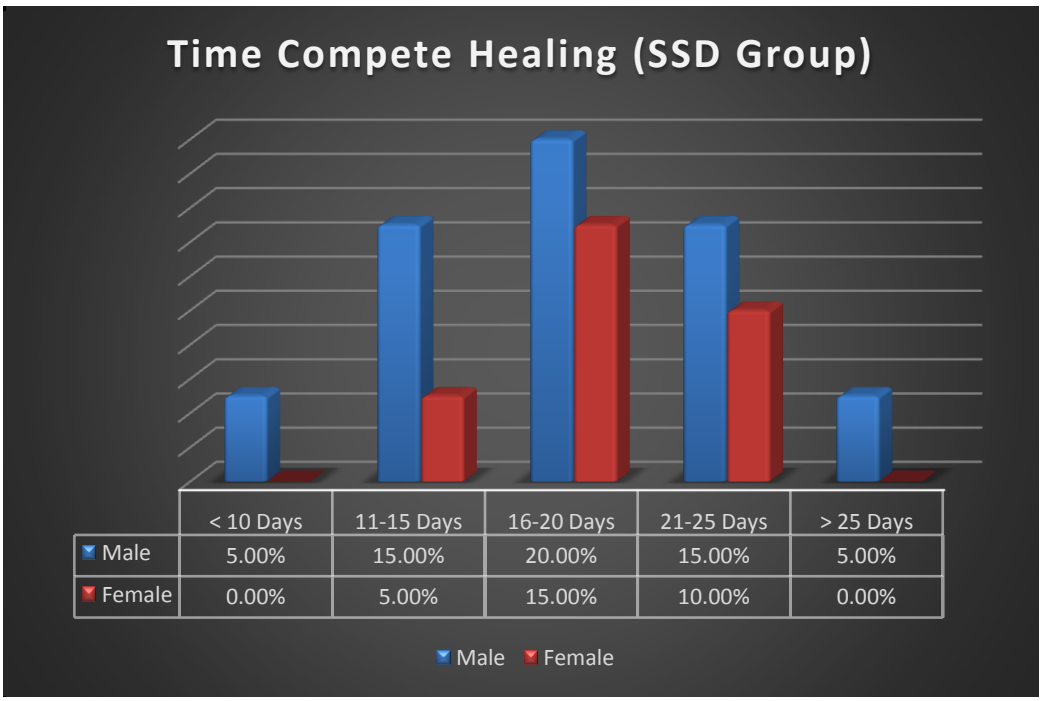
We have compare gender honey group to assess in which group more patients required less number of days for healing and we have found that in female group more number of patients required less number of days for healing compare to male group and this result is statistically significant, p = 0.004

12. TIME COMPLETE HEALING GENDER WISE (SSD GROUP)

Table 13: Time Complete Healing Gender wise (SSD Group)

Time for Compete Healing (SSD Group)	Male	%	Female	%	p value
< 10 Days	1	5.00%	0	0.00%	
11-15 Days	3	15.00%	1	5.00%	
16-20 Days	4	20.00%	3	15.00%	**0.007**
21-25 Days	3	15.00%	2	10.00%	
> 25 Days	1	5.00%	0	0.00%	

Graph 13: Time Complete Healing Gender wise (SSD Group)



We have compare gender honey group to assess in which group more patients required less number of days for healing and we have found that in female group more number of patients required less number of days for healing compare to male group and this result is statistically significant, p = 0.004.

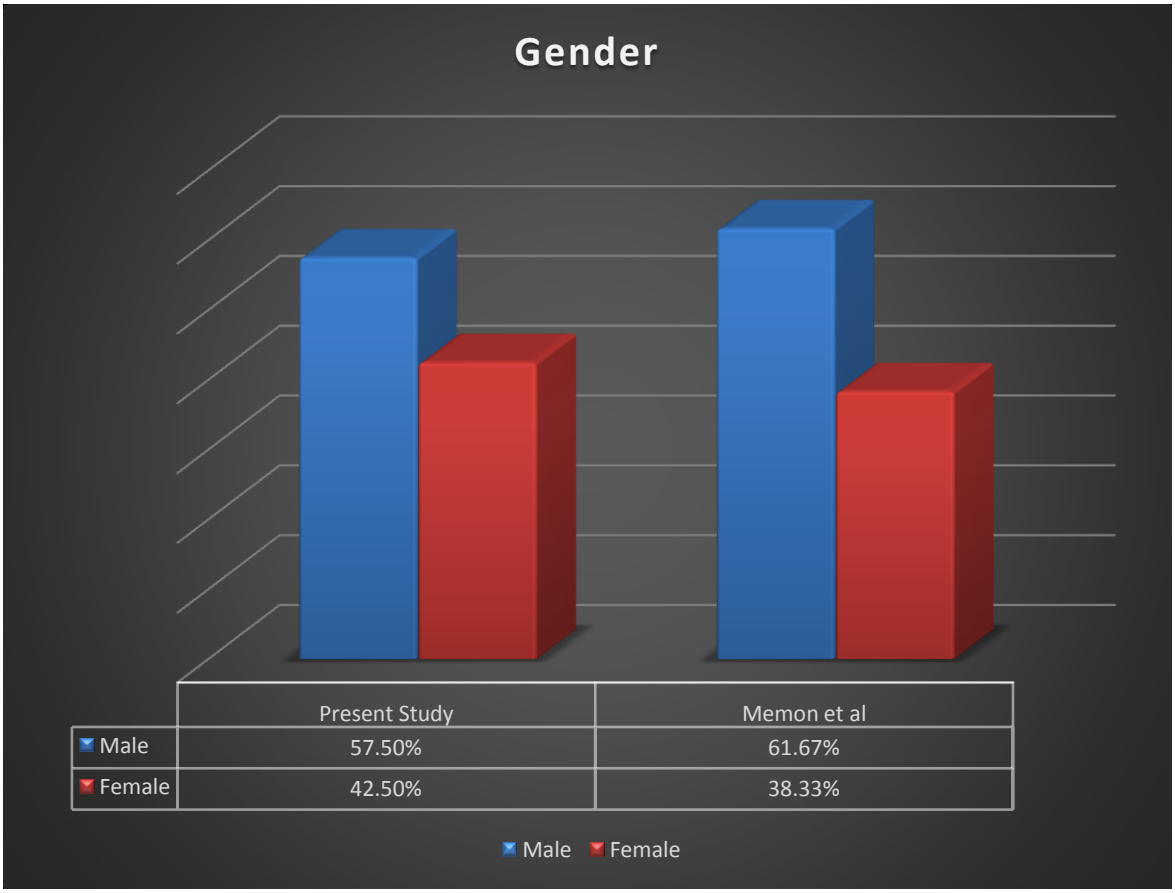
DISCUSSION

1. COMPARISON OF GENDER DISTRIBUTION

Table 12: Comparison of Gender Distribution

Gender	Present Study	%	Memon et al	%
Male	23	57.50%	37	61.67%
Female	17	42.50%	23	38.33%
Total	**40**	**100.00%**	**60**	100.00%

Graph 12: Comparison of Gender Distribution



- We have compared number of patients enrolled in present study with the study done byMemon et al and we have found that in Memon et al study there were total 60 patients enrolled and in the present study we have enrolled 40 patients.

- Furthermore, we also compared the gender distribution in both the study but we found the consistent results of present study with Memon et study. In Memon et al study percentage of male patients were higher compared to female patients but it was not statistically significant whereas in present study also percentage of male patients were higher but again it was not statistically significant.

- Male predominance was found in both studies may be attributed to those population working at risk areas more prone to trauma and other injuries.

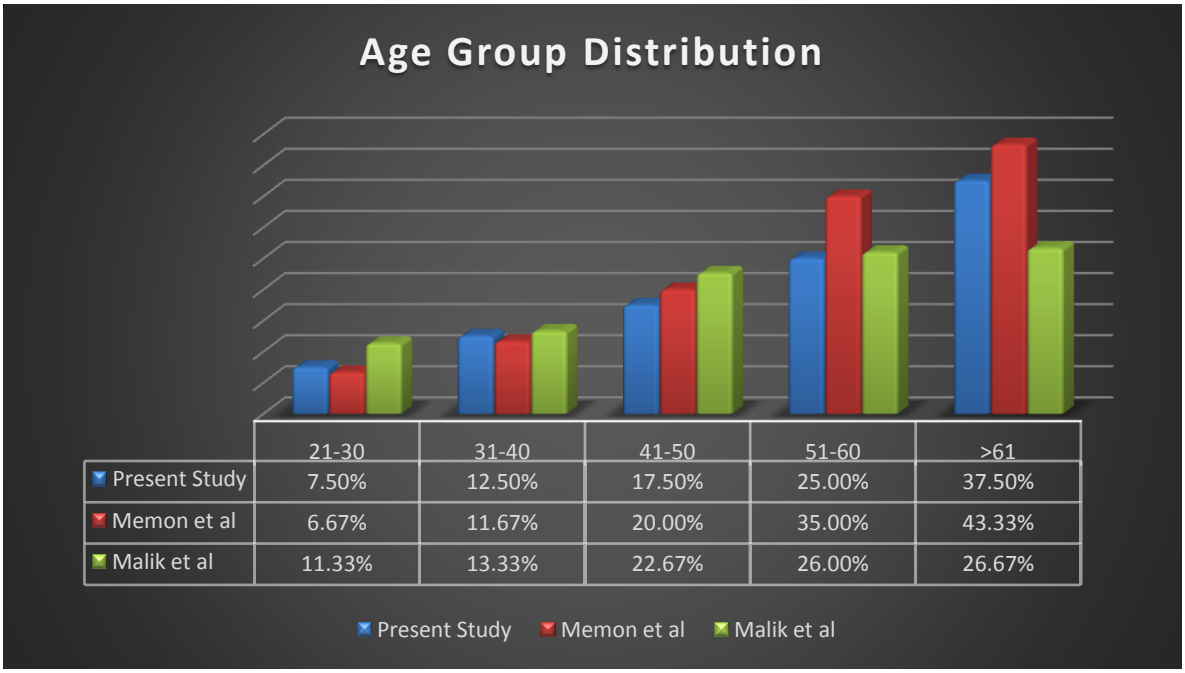
- Female population in our country are mainly housewives and have to cook food mainly by burning traditional chulas as India is a developing country. Thus, making these population vulnerable to burn injury.

2. COMPARISON OF AGE GROUP DISTRIBUTION:

Table 13: Comparison of Age Group Distribution

Age Distribution	Present Study	%	Memon et al	%	Malik et al	%
21-30	3	7.50%	4	6.67%	17	11.33%
31-40	5	12.50%	7	11.67%	20	13.33%
41-50	7	17.50%	12	20.00%	34	22.67%
51-60	10	25.00%	21	35.00%	39	26.00%
>61	15	37.50%	26	43.33%	40	26.67%
Total	**40**	100.00%	**60**	100.00%	**150**	100.00%

Graph 13: Comparison of Age group distribution



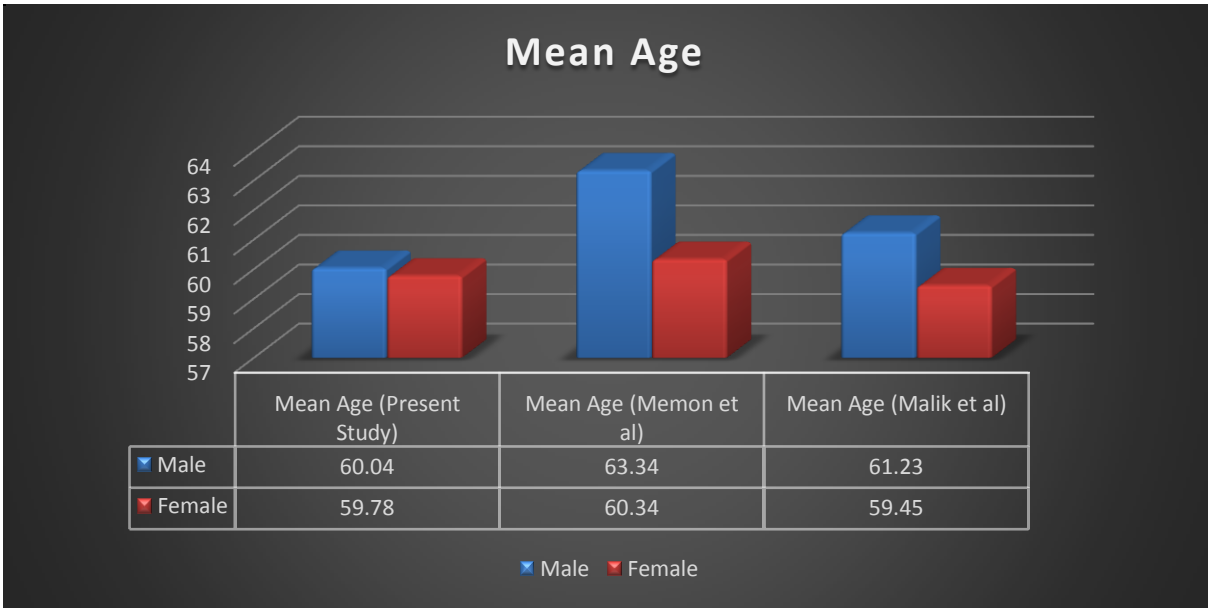
- In above table and graph we have shown the comparison of different age groups of present study with two other studies, i.e. Memon et al and Malik et al.
- In Memon et al and Malik et al study they have majority of patients with age of more than 50 years which is similar to present study.
- In Memon et al study more than 75% of patients were falls in age group of more than 50 years.
- In Malik study, more than 50% of the patients were of more than 50 years.
- We observed that our results were similar with both the studies.
- In present study, majority patients (62.50%) who enrolled in the study were had age more than 50 years.
- Wound healing time is reduced as the age progresses and the population above the age of 50 years are having comorbid conditions like hypertension, diabetes, peripheral vascular disease like atherosclerosis, thus presents with chronic wound.
- In the modern world, these population are not taken care of by their children's and abandoned thus neglects early and small wound.

3. COMPARISON OF MEAN AGE OF THE PATIENTS:

Table 14: Comparison of Mean Age of the Patients

Gender	Mean Age (Present Study)	SD	Mean Age (Memon et al)	SD	Mean Age (Malik et al)	SD
Male	60.04	9.45	63.34	10.56	61.34	12.45
Female	59.78	10.34	60.34	11.34	59.45	11.23
Total	**59.91**	**9.89**	**61.84**	**10.95**	**60.40**	**11.84**

Graph 14: Comparison of Mean Age of the Patients



- In above table and graph we have shown the comparison of mean age of present study with two other studies, i.e. Memon et al and Malik et al. And we have found that our results were similar with both the studies.
- In Memon et al and Malik et al study they had patients with mean age 61.84±10.95 years and 60.40±11.84 which is similar to present study, i.e. 59.91±9.89.
- Furthermore we have compared mean age of both gender of present study with Memon et al study and Malik et al study and we have found

that in all three studies including present study age of male patients is slightly higher compare to female patients so, this results were also consistent with other studies.

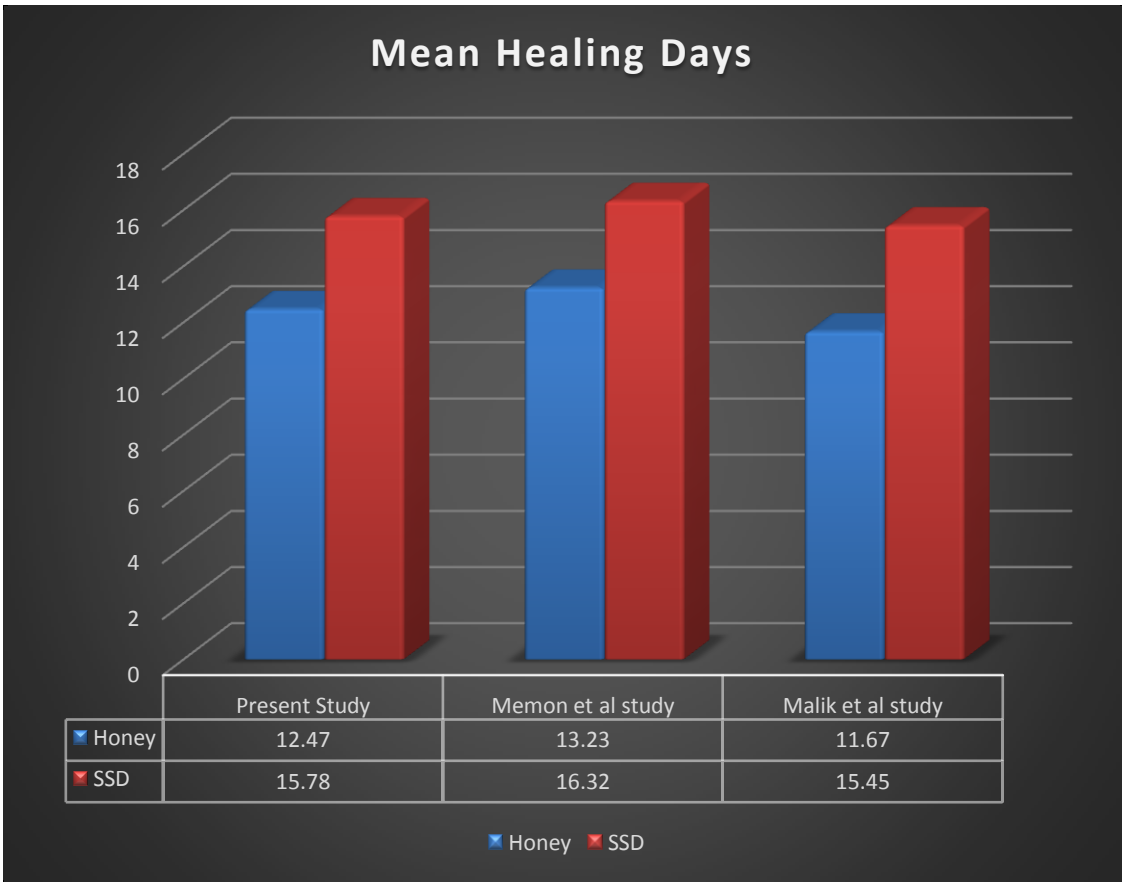
- In Memon et al study mean age of male was 63.34±10.56 years and mean age of female patients was 60.34±11.34 years where as in Malik study mean age of male patients was 61.23±12.45 years and mean age of female patients was 59.45±11.23 years all these results we found similar in present study i.e. mean age of male patients of present study was 60.04±9.45 years and mean age of female patients was 59.78±10.34 years.

4. COMPARISON OF AVERAGE HEALING DAYS

Table 15: Comparison of Average Healing Days:

Mean Healing Days						
Group	**Present Study**	**SD**	**Memon et al study**	**SD**	**Malik et al study**	**SD**
Honey	12.47	4.15	13.23	4.32	11.67	7.12
SSD	15.78	5.78	16.32	6.56	15.45	6.89
Total	**14.12**	**4.96**	**14.72**	**5.23**	**13.45**	**7.03**

Graph 15: Comparison of Average Healing Days



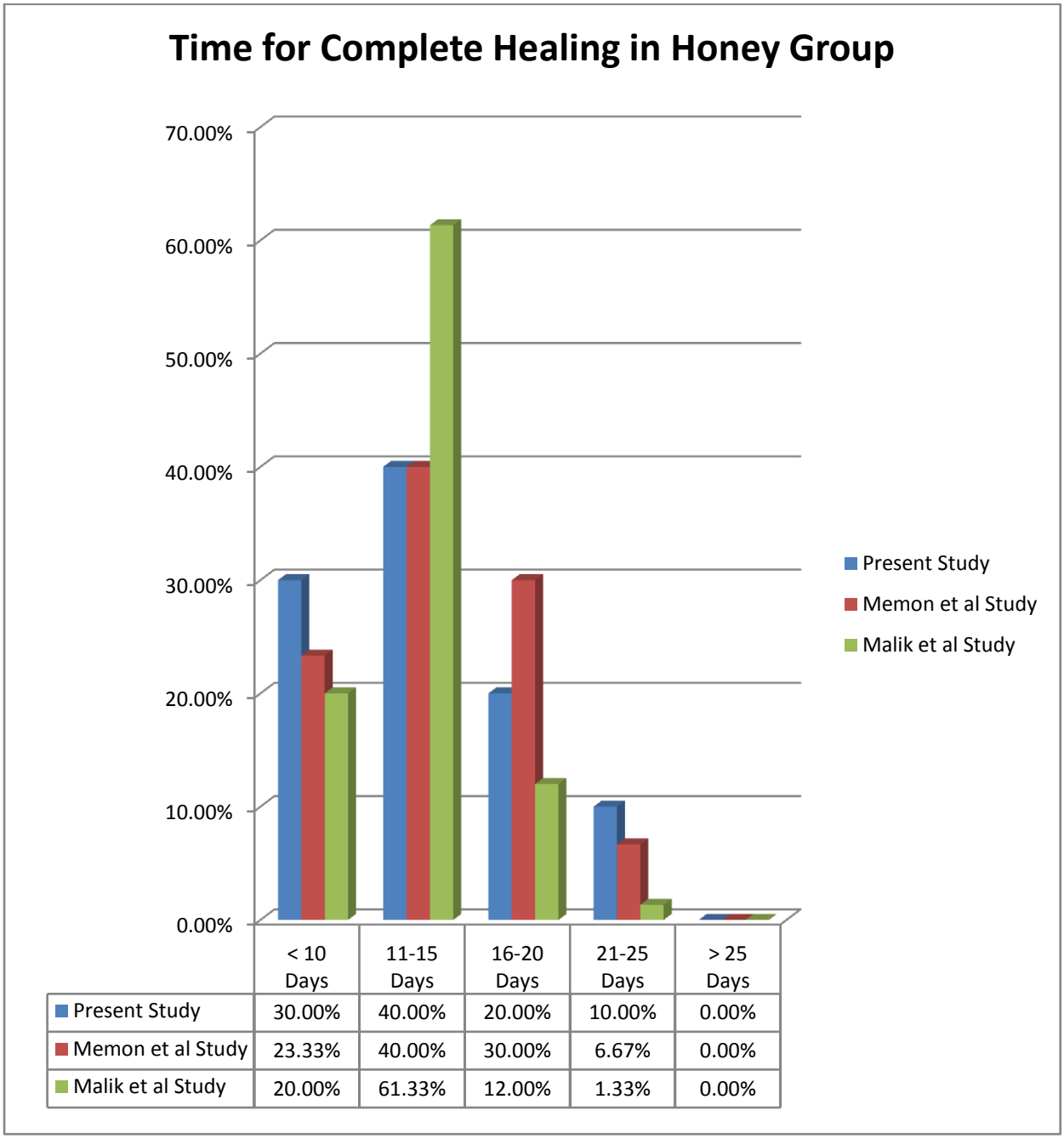
- In above table and graph we have shown the comparison of average healing days required in present study with two other studies and we have found similar results with both the studies.
- Mean healing days in Memon et al study was 14.72±5.23 days where as in Malik et al study they have noted mean healing day was 13.45±7.03 days and in present study we have found mean healing day was 14.12±4.96 days.
- Furthermore, we have compared our results of comparison of mean healing days required in Honey Group and SSD group with both the study and we found that in honey group significant fewer days are required for healing compare to SSD group in all three studies including present study.
- In Memon et al study Mean healing days required in honey group was 13.23±4.32 days and in SSD group 16.32±6.56 days.
- In Malik et al study Mean healing days required in honey group was 11.67±7.12 days and in SSD group 15.45±6.89 days.
- In Present Study Mean healing days required in honey group were 12.47±4.15 days and in SSD group 15.78±5.78 days.
- In all three-studies p value was 0.000.
- Thus, healing time with honey impregnated dressing is less than Silver Sulfadiazine(SSD).

5. COMPARISON OF TIME FOR COMPLETE HEALING:

Table 16: Comparison of Time for Complete Healing

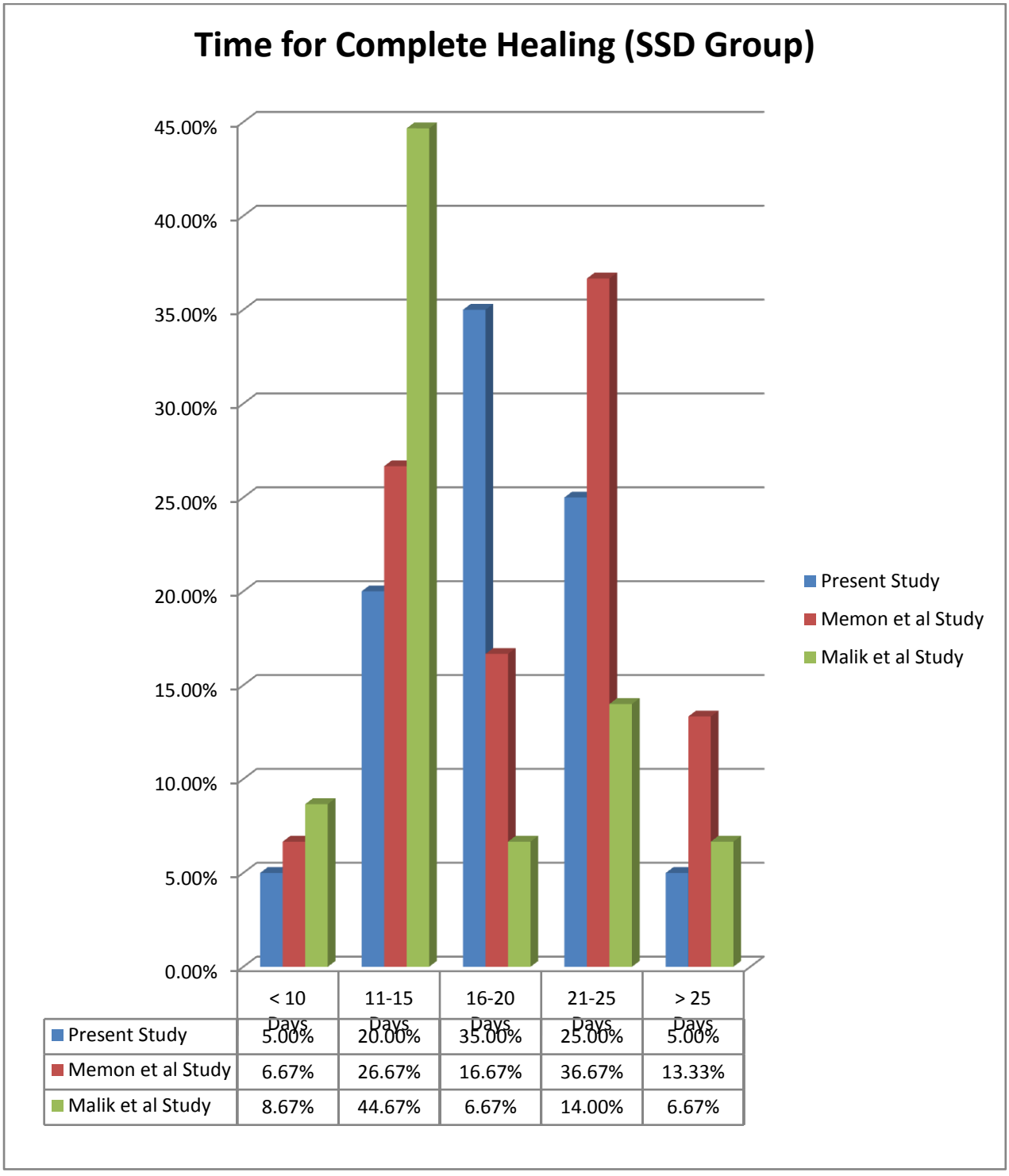
Time for Compete Healing	Present Study				Memon et al Study				Malik et al Study			
	Honey	%	SSD	%	Honey	%	SSD	%	Honey	%	SSD	%
< 10 Days	6	30.00 %	1	5.00 %	7	23.33 %	2	6.67%	30	20.00%	13	8.67 %
11-15 Days	8	40.00 %	4	20.00%	12	40.00 %	8	26.67 %	92	61.33%	67	44.67%
16-20 Days	4	20.00 %	7	35.00%	9	30.00 %	5	16.67 %	18	12.00%	10	6.67 %
21-25 Days	2	10.00 %	5	25.00%	2	6.67%	11	36.67 %	2	1.33 %	21	14.00%
> 25 Days	0	0.00 %	1	5.00 %	0	0.00%	4	13.33 %	0	0.00 %	10	6.67 %

Graph 16: Time for Complete Healing in Honey Group



	< 10 Days	11-15 Days	16-20 Days	21-25 Days	> 25 Days
Present Study	30.00%	40.00%	20.00%	10.00%	0.00%
Memon et al Study	23.33%	40.00%	30.00%	6.67%	0.00%
Malik et al Study	20.00%	61.33%	12.00%	1.33%	0.00%

Graph 17: Time for Complete Healing in SSD Group:



	< 10 Days	11-15 Days	16-20 Days	21-25 Days	> 25 Days
Present Study	5.00%	20.00%	35.00%	25.00%	5.00%
Memon et al Study	6.67%	26.67%	16.67%	36.67%	13.33%
Malik et al Study	8.67%	44.67%	6.67%	14.00%	6.67%

- In above table and graphs, we have shown the comparison of Time for complete healing in present study with other two studies and we have found that in all three studies including present study in SSD group comparatively higher number of days required for complete healing compare to Honey group.
- In Memon et al study it was found that majority if the patients required less than 20 days for complete healing where as in SSD group there were 40% of the patients required more than 20 days compare to Honey group which required only 6.67% of patients more than 20 days in complete healing. These results were statistically significant.
- In Malik et al study it was found that majority if the patients required less than 20 days for complete healing where as in SSD group there were 20.67% of the patients required more than 20 days compare to Honey group which required only 1.33% of patients more than 20 days in complete healing. These results were statistically significant.
- In Present study, it was found that majority if the patients required less than 20 days for complete healing where as in SSD group there were 30% of the patients required more than 20 days compare to Honey group which required only 10% of patients more than 20 days in complete healing. These results were statistically significant.
- In present study, we also do comparison time required for complete healing in both gender of the both groups and we have found that in male patients more time required for healing compare to female patients and these results are statistically significant.
- We also found diabetes mellitus was common in majority of our enrolled patients, i.e. 60.00%.

SUMMARY:

- In the present study, we had enrolled total 40 patients who were presented with chronic wound at the department of Surgery, Dhiraj General Hospital, Sumandeep Vidyapeeth.
- Out of total 40 patients 57.50 % were male and 42.50% were female and all the patients were divided into two groups i.e. Honey group and SSD group.
- Allocation of the group was done randomly.
- It was observed that mean age of all the enrolled participants was 59.91 ± 9.89 years where as when we calculated mean age for both gender than we have found that mean age for male patient was 60.04±9.45 years and mean age for female participants was 59.78±10.34 years. So, it has been seen that mean age of male participant was comparatively more than female participants.
- In present study, we have divided patients in five age groups. i.e 21-30 year, 31-40 years, 41-50 years, 51-60 years and >60 years and we have found that majority of the patients were fall in age group of more than 61 years (37.50 %), followed by 51-60 years (25.00%), 41-50 years (17.50%), 31-40 years (12.50%) and 21-30 years (7.50%).
- In Our study both group similarly higher number in higher age group and simultaneously number of patients were decreasing in young age group compare to elder age group.
- In present study, we have compare the mean healing days required in both groups by using independent t test and found that mean healing days was significantly less in honey group compare to mean healing days required in SSD group, i.e. 12.47±4.15 vs. 15.78±5.78. We found p value was 0.000 which is highly significant.
- We have compare both honey and SSD group to assess in which group more patients required less number of days for healing and we have found that in honey group more number of patients required less number

of days for healing compare to SSD group and this result is statistically significant, p = 0.000

- We had distributed all patients in two groups i.e. Honey group and SSD group. We had found that in Honey group 55.00% were male and 45.00% were female whereas in SSD group 60.00% were male and 40.00% were female
- In present study, we have compare the mean healing days required in both genders by using independent t test and found that mean healing days was significantly less in female patients compare to mean healing days required in male patients in both Honey and SSD groups, we found p value was 0.000 which is highly significant.
- We had compare gender honey group to assess in which group more patients required less number of days for healing and we have found that in female group more number of patients required less number of days for healing compare to male group and this result is statistically significant, p = 0.004
- We had compare gender honey group to assess in which group more patients required less number of days for healing and we have found that in female group more number of patients required less number of days for healing compare to male group and this result is statistically significant, p = 0.004
- In present study, we have found that most of the patients had history of diabetes (60.00%) followed by burns, Infection and tumors.

CONCLUSION:

- We have compared number of patients enrolled in present study with the study done by Memon et al and we have found that in Memon et al study there were total 60 patients enrolled and in the present study we have enrolled 40 patients.

- Furthermore, we also compared the gender distribution in both the study but we found the consistent results of present study with Memon et study. In Memon et al study percentage of male patients were higher compared to female patients but it was not statistically significant whereas in present study also percentage of male patients were higher but again it was not statistically significant.

- Male predominance was found in both studies may be attributed to those population working at risk areas more prone to trauma and other injuries.

- Female population in our country are mainly housewives and have to cook food mainly by burning traditional chulas as India is a developing country. Thus, making these population vulnerable to burn injury.

- We observed that our results were similar with both the studies of comparison of different age groups of present study with two other studies.
- In present study, majority patients (62.50%) who enrolled in the study were had age more than 50 years.
- Wound healing time is reduced as the age progresses and the population above the age of 50 years are having comorbid conditions like hypertension, diabetes, peripheral vascular disease like atherosclerosis, thus presents with chronic wound.

- In the modern world, these population are not taken care of by their children's and abandoned thus neglects early and small wound.

- Comparison of mean age of present study with two other studies, i.e. Memon et al and Malik et al. And we have found that our results were similar with both the studies.
- Furthermore, we have compared mean age of both gender of present study with Memon et al study and Malik et al study and we have found that in all three studies including present study age of male patients is slightly higher compare to female patients so, this results were also consistent with other studies.
- Comparison of average healing days required in present study with two other studies and we have found similar results with both the studies.
- Mean healing days in Memon et al study was 14.72±5.23 days where as in Malik et al study they have noted mean healing day was 13.45±7.03 days and in present study we have found mean healing day was 14.12±4.96 days.
- Furthermore, we have compared our results of comparison of mean healing days required in Honey Group and SSD group with both the study and we found that in honey group significant fewer days are required for healing compare to SSD group in all three studies including present study.
- In Memon et al study Mean healing days required in honey group was 13.23±4.32 days and in SSD group 16.32±6.56 days.
- In Malik et al study Mean healing days required in honey group was 11.67±7.12 days and in SSD group 15.45±6.89 days.
- In Present Study Mean healing days required in honey group were 12.47±4.15 days and in SSD group 15.78±5.78 days.
- In all three-studies p value was 0.000.
- Thus, healing time with honey impregnated dressing is less than Silver Sulfadiazine(SSD).

- Comparison of Time for complete healing in present study with other two studies and we have found that in all three studies including present study in SSD group comparatively higher number of days required for complete healing compare to Honey group.
- In Memon et al study it was found that majority if the patients required less than 20 days for complete healing where as in SSD group there were 40% of the patients required more than 20 days compare to Honey group which required only 6.67% of patients more than 20 days in complete healing. These results were statistically significant.
- In Malik et al study it was found that majority if the patients required less than 20 days for complete healing where as in SSD group there were 20.67% of the patients required more than 20 days compare to Honey group which required only 1.33% of patients more than 20 days in complete healing. These results were statistically significant.
- In Present study, it was found that majority if the patients required less than 20 days for complete healing where as in SSD group there were 30% of the patients required more than 20 days compare to Honey group which required only 10% of patients more than 20 days in complete healing. These results were statistically significant.
- In present study, we also do comparison time required for complete healing in both gender of the both groups and we have found that in male patients more time required for healing compare to female patients and these results are statistically significant.
- We also found diabetes mellitus was common in majority of our enrolled patients, i.e. 60.00%.
- SSD dressing did not have any added benefit over honey dressing in terms of healing and making wound sterile. It is concluded that although there is evidence of antibacterial effect, there is no direct evidence of improved healing or reduced infection by SSD dressing.
- When both type of dressings were compared, early subsidence of acute inflammatory changes, better control of infection and quicker wound

healing were observed with honey dressing, while in the SSD-treated wounds sustained inflammatory reaction was noted even on epithelialization.

- Also, it was clear that increase in time of admission had adverse effect on wound healing and complication at follow-up. This is more so for SSD dressing.
- Relief of pain, lower incidence of hypertrophic scar and postburn contracture, low cost and easy availability make honey an ideal dressing in the treatment of chronic ulcer and burns.
- Delay in hospital admission increases wound contamination and infection thereby delaying wound healing which has a detrimental effect on final outcomes. Since honey dressing improves wound healing by rendering it sterile in lesser duration of time, wounds thus treated have a better outcome in terms of hypertrophic scarring and post-burn contractures; this is due to the fact that early healing mitigates the need for debridement at when compared to SSD dressing. Hence, Honey dressing is a better option for dressing in burns, in terms of decreased morbidity, economy, patient well-being and speedy rehabilitation.

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Sr No	Group	Age	Gender	Etiology	Size of Wound	Healing Time	TC	Hb	RBS
1	A	60	M	Infection	4	6	4800	10.9	124
2	A	70	M	Burns	3	11	8800	9.8	125
3	A	60	M	Burns	6	14	12000	7.8	110
4	A	60	M	Trauma	8	9	11000	11	105
5	A	65	M	Diabetes	9	4	11000	10.9	150
6	A	70	M	Trauma	12	15	12500	10	104
7	A	55	M	Burns	15	4	20000	11	102
8	A	60	M	Infection	14	5	20000	11	139
9	A	52	M	Diabetes	16	14	21000	10	156
10	A	60	M	Burns	16	7	12220	12	121
11	A	60	M	Trauma	18	13	17500	8	101
12	A	69	F	Trauma	19	13	14335	10.3	100
13	A	60	F	Infection	20	11	10000	9.6	195
14	A	60	F	Diabetes	16	12	19400	6.4	162
15	A	65	F	Burns	25	16	10100	9.3	96
16	A	70	F	Diabetes	24	18	18370	10.7	157
17	A	55	F	Burns	23	19	11311	8.9	125
18	A	60	F	Tumour	21	16	12400	10.7	85
19	A	50	F	Diabetes	21	21	11000	10.1	185
20	A	44	F	Diabetes	25	24	7516	10.1	142
21	B	40	M	Tumour	3	11	14000	6.4	128
22	B	48	M	Diabetes	2	13	12000	12	152
23	B	50	M	Diabetes	3	8	22000	4.9	168
24	B	40	M	Tumour	1	11	11000	12.4	122
25	B	40	M	Diabetes	6	15	8000	10.4	157
26	B	50	M	Diabetes	7	16	6730	7.2	154
27	B	40	M	Diabetes	7	20	13786	8.2	158
28	B	50	M	Diabetes	7	19	5500	7.4	156
29	B	50	M	Diabetes	6	18	11340	9.3	169
30	B	42	M	Diabetes	11	16	10500	5.5	153
31	B	60	M	Diabetes	14	16	10300	9.2	152
32	B	65	M	Diabetes	16	18	18720	8.2	149
33	B	70	F	Diabetes	19	21	10000	12.5	153
34	B	55	F	Diabetes	17	25	18000	7.2	152
35	B	60	F	Diabetes	19	21	9000	10	158
36	B	50	F	Diabetes	19	22	11000	10	187
37	B	44	F	Diabetes	23	24	11000	6.9	198
38	B	40	F	Diabetes	24	15	12000	8.3	197
39	B	48	F	Diabetes	26	12	10000	10	145
40	B	50	F	Diabetes	24	11	10000	9.7	154