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Original Article

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A Comparative Study on the Effectiveness of Shoulder Tap Push-up and Half Kneeling Press in Distance Throwing among Amateur Cricket players

Aadesh Gupta[1], Neeraj Kumar[2]

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ABSTRACT

Objective: To find out the effect of shoulder tap push up with grip strengthening in distance throwing among cricket players and to find out the effect of half kneeling shoulder press with grip strengthening in distance throwing among cricket players.

Materials and Method: 110 voluntary participants were recruited according to the selection criteria and were randomly allocated to Group A shoulder tap push up exercise (n=55) and Group B half kneeling shoulder press exercise (n=55). The exercise program underwent training for 30 min, 4 times per week for 4 weeks.

Result: When post values of Group A for hand dynamometer i.e., 39.98 ± 12.461 and Group B i.e.; 47.21 ± 8.841 was compared there was improvement in group B as compared to Group A the p-value was extremely significant that is (0.0001). When post value of group A and Group B for 2 kg medicine ball were compared i.e., 4.51± 1.259 and 5.45 ± 1.044 there was improvement seen in group B as compared to group A with an extremely significant p value of (0.0001).

Conclusion: The results from the present study are very encouraging and demonstrate the benefit of half kneeling shoulder press with grip strengthening over shoulder tap push up with grip strengthening in improving throwing distance. Thus, half kneeling shoulder press can be incorporated into training programs of cricket players for enhancing their performance levels.

Keywords: Shoulder Tap Push Up; Half Kneeling Shoulder Press; 2kg Medicine Ball; Hand Dynamometer.

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INTRODUCTION

Cricket is a tremendously enduring and well liked sport. In the late 16th century, this sport was developed in the south east of England. It became the national sport of England in the eighteenth century, spread over the world in the nineteenth and twentieth centuries, and is still one of the most popular sports in the world today. It is referred to as the game of uncertainty. The outcome of the game can be predicted using the appropriate

probability model[1], despite the fact that it is impossible to forecast the result until the very last second. Cricket has been played in a format called a test match for a very long time. Each team gets two innings during the five day test match. This condensed version of the cricket was popular with viewers and was also financially successful. The player's performance becomes a crucial factor for the board in this short format game with a limited amount of overs, such as matches with 20 and 50 over, nevertheless. The International Cricket Council (ICC) is the governing body of cricket, and One-Day International (ODI) cricket, which is played in a 50-over format every four years, is the premier international competition. It is the biggest cricket tournament and one of the most watched sporting events in the world. The Indian Premier competition (IPL), which consists of one day matches with a 20 over limit, is the most watched cricket competition outside of India.[1] Cricket makes considerable use of throwing. Numerous precise important throws are made throughout the course of the game. To play cricket effectively, athletes must be able to toss the ball forcefully and precisely from one end of the field to the other. Athletes who throw incorrectly risk suffering several injuries.[2] The physical contributions of many distinct physical elements, including as core stability, range of motion, limb length, and isokinetic components, contribute to the success of a throw in addition to strong technique. Cricket players need more momentum and strength since the cricket ball goes farther and faster.[3] Additionally, a physical component like cardiorespiratory endurance, or VO2 max[4-9] flexibility and strength of muscles was essential. Cricket players' handgrip strength also influences their throwing distance.[10] In several aspects of cricket, such as fielding and bowling, strong and accurate throwing is crucial. Few research have compared the effects of various workouts on throwing abilities, and even fewer have proposed some effective activities to increase throwing talents. However, few studies have examined the differences between shoulder push-ups and half-knee shoulder presses. Therefore, the purpose of present research work was to compare the effectiveness of shoulder tap push-up and half kneeling shoulder press in distance throwing among amateur cricket players. This will help players, coaches, athletic trainer and physiotherapists to work better on throwing abilities of cricket players.

METHODOLOGY

A total of 150 amateur cricket players voluntarily gave his consent for participation in this study, and they all were shortlisted. The players were college level cricket players, aged between 18 to 26 years, who were regular for 6 months to 1 year and plays at a frequency of minimum 40 min twice a week, and all had qualified PAR-Q. The players with any recent injuries or surgery which can affect their throwing abilities were excluded from participation. Out of these 150 shortlisted players a total of 110 amateur cricket players randomly selected for participation in this study. There hand grip strength and throwing distance were recorded before starting intervention.

Outcome Measures

1. All participants' hand grip strength was assessed using a JAMER hand dynamometer to determine hand grip strength. Three trials with sufficient rest in between were recorded, and the average of these three trials was documented.
2. Participants were requested to stand behind a line on the ground and throw a 2 kg medicine ball as far as they could in order to assess distance. The distance the medicine ball traveled was measured in meters. The best recording was found after three of these trials, with appropriate rest in between each experiment.

All these 110 participants were randomly divided into two equal groups of 55 each. Group A received intervention of shoulder tap push-Up and Group B received half kneeling shoulder press exercises for 4 weeks.

Intervention: 30 min Duration

1 set of 10 repetitions.

4 sets (2 sets each with right and left side) a day.

4 days a week (on every alternate day either "Mon-Wed-Fri-Sun" or "Sun-Tue-Thur-Sat").

Group A (Shoulder Tap push-up Exercise): for 4 weeks:

1. Stand in a plank position with your feet hip width apart and your hands under your shoulders. Participants gently drop their torso toward the ground while keeping their knees and abdominals firm and their elbows bent and directed backward.
2. Exhale as you lift your right hand to the top of the plank, lengthen your arms, and tap your left shoulder with it. Tap your other arm in the same manner.

Group B (half kneeling shoulder press exercises): for 4 weeks:

1. Choose a suitable load, then take a half-kneeling position on the ground. Left leg should be lifted, right knee should be bent, and the right hand should bear the weight. Clean the dumb bell to the shoulder, if necessary with both hands. With the palm facing in, begin with a neutral grip. Keep your spine neutral, shoulders back, and head up. This is where the game will begin.
2. Start the motion by extending your arm, flexing it, and abducting your shoulder so that it rotates and presses above your head. The movement should be reversed to return to the starting position after a brief pause at the top.
3. After completing the required number of repetitions, move to the other side.

After 4 weeks of intervention, once again their hand grip strength and throwing distance were recorded.

This study was approved by Institution Ethics Committee of Dr. A.P.J. Abdul Kalam College of Physiotherapy, Pravara Institute of Medical Sciences (Deemed to be University).

Data Analysis: Mean and standard deviation were calculated for descriptive statistics. Students paired t test was used to calculate difference between pre and post values among the group and students, unpaired t test was used to calculate differences between the both groups. The confidence interval was 95%. The statistical analysis was done by SPSS v 20.

RESULTS & ANALYSIS

Data of 110 participants was analysed and randomly distributed into group A (N=55) and group B (N=55). With a mean age of 20.96 for group A and 21.56 years for group B, average BMI of 46 participants of group A and 45 participants of group B lied between 15-25 and only 9 participants of group A and 10 of group B participants lied between 25.1-35. The PAR-Q scale was cleared by 51 in group A participants out of 55 and by all 55 group B participants.

Table 1: Gender Distribution of Group A and Group B

Gender	Male	Female	Total
Group A	49	6	55
	89.1%	10.9%	100%
Group B	54	1	55
	98.2%	1.8%	100%
Total	103	7	110

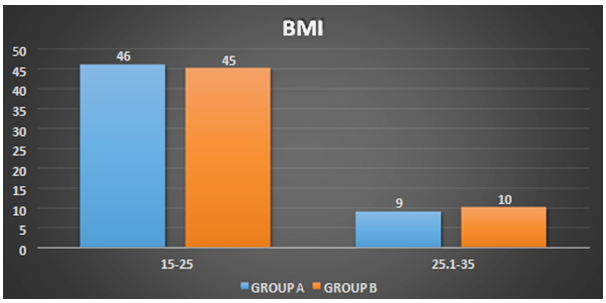

Fig. 1: BMI Distribution of Group A and Group B

Table 2: Comparison Within the Mean of Pre and Post Values of Group A.

Group A	Assessment	MEAN ± SD	T Value	P- Value	Significant
Hand Dynamometer	Pre	38.76 ± 12.064	7.432	<0.0001	Extremely Significant
	Post	39.98 ± 12.461			
Medicine Ball	Pre	4.37± 1.22	4.704	<0.0001	Extremely Significant
	post	4.51± 1.259			

Table 3: Comparison Within the Mean of Pre and Post Values of Group B

Group B	Assessment	MEAN ± SD	T Value	P- Value	Significant
Hand Dynamometer	Pre	38.8 ± 7.74	4.322	<0.0001	Extremely Significant
	Post	47.21 ± 8.841			
Medicine Ball	Pre	4.22 ± 0.74	9.742	<0.0001	Extremely Significant
	Post	5.45 ± 1.044			

Table 4: Comparison Between the Mean Values of Hand Dynamometer for Group A and Group B

Hand Dynamometer	Group A	Group B	T Value	P Value	Significance
Pre	38.76 ± 12.064	38.8±7.742	0.362	0.717	Not Significant
Post	39.98 ± 12.461	47.21 ± 8.841	4.421	<0.0001	Extremely Significant

Table 5: Comparison Between the Mean Values of Medicine Ball for Group A and Group B

Medicine Ball	Group A	Group B	T Value	P Value	Significance
Pre	4.37± 1.22	4.22±0.741	0.3226	0.7477	Not Significant
Post	4.51± 1.259	5.45 ± 1.044	5.312	<0.0001	Extremely Significant

DISCUSSION

This discussion aims to present a fair analysis of many workouts, including grip strengthening, shoulder tap push-ups, half kneeling shoulder presses, and shoulder taps, in terms of their definitions and contributions to athletic feats like throwing distance among amateur cricket players. The study's goal is to contrast the effects of shoulder tap push-ups with grip strengthening and half kneeling shoulder presses with grip strengthening on throwing distance in amateur cricket players. One of the most important aspects of throwing is thought to be an upper body strength training regimen. When throwing, the deltoid, triceps, biceps, and rotator cuff muscles' biomechanics are crucial.[11]

It was discovered that performing shoulder tap pushups for four weeks improved hand grip strength and throwing prowess. Similar to this, 4 weeks of half-kneeling shoulder press workouts have also been reported to improve hand grip strength and throwing prowess. The results of Sharma *et al.* 2020[13] and Vishen & Sen, 2015[12], which revealed that both of these workouts are effective in developing strength and consequently other relevant abilities, provide more support for this conclusion.

The findings of the current study demonstrated that shoulder tap push-ups with grip strengthening were inferior to half-kneeling shoulder presses with grip strengthening. Flanagan, 2008[11], which hypothesized advantages of shoulder press, supports it. This finding of the current study is also in agreement with a study by Swanik *et al.* 2002[14], which indicated that plyometric training increased the shoulder proprioception, kinesthesia, isokinetic strength, and power of female collegiate swimmers.

CONCLUSION

The benefits of shoulder tap, push-up, and half kneeling shoulder press work outs are clearly shown by the results of the current study, which are highly positive. It has been discovered that both of these exercises help to improve throwing talents. Further more, it has been discovered that shoulder press exercises done while half kneeling are superior to shoulder tap push-ups for increasing throwing distance. To improve cricket players' performance levels, half kneeling shoulder presses might be added to their training regimens.

REFERENCES

1. Shah S, Hazarika PJ, Hazarika J. A study on performance of cricket players using factor analysis approach. International Journal of Advanced Research in Computer Science. 2017 Mar 15;8(3):656-60.
2. Orchard, J.W., Kountouris, A. and Sims, K. (2016) "Incidence and prevalence of elite male cricket injuries using updated consensus definitions," Open Access Journal of Sports Medicine, Volume 7, pp. 187–194. Available at: https://doi.org/10.2147/oajsm.s117497.
3. Olivier B, Taljaard T, Burger E, Brukner P, Orchard J, Gray J, *et al.* Which extrinsic and intrinsic factors are associated with non-contact injuries in adult cricket fast bowlers? Sports Medicine. 2015;46(1):79–101.
4. Kumar N, Sharma S. Effect of tobacco chewing on VO2 max. Med Sportiva 2011;7:1680-4.
5. Kumar N, Laroiya N. Association of VO2 max, agility and BMI among collegiate athletes. Ann Sports Med Res 2017;4:1121.
6. Kumar N, Goswami S. Comparison of Rockport one-mile walk test and McArdle step test for prediction of VO2 max. Saudi J Sports Med 2019;19:82-5.
7. Kumar N, Srivastava D, Tiwari NN, Dwivedi S. Effective time for consumption of preexercise energy drink to enhance cardiorespiratory fitness. Saudi J Sports Med [serial online] 2017 [cited 2023 Aug 17];17:79-81. Available from:https://www.sjosm.org/text.asp?2017/17/2/79/207575.
8. Kumar N, Singh A, Sinha N, Tripathi VM. Comparison of physical fitness between tobacco chewer and non-tobacco chewer. Saudi J Sports Med [serial online] 2015 ;15:137-41. Available from: https://www.sjosm.org/text.asp?2015/15/2/137/156344.
9. Kumar N, Archana, Singh. To determine the association of cardio respiratory fitness with

anthropometric characteristics in collegiate athletes. Serbian J of sports sci. 2015; 9: 27-30.

10. Shanbhag AR, Kumar N. Correlations of Anthropometric Measurement and Handgrip Strength between Collegiate Cricket Fast and Spin Bowlers. Indian Journal of Physiotherapy & Occupational Therapy. 2021 Oct 1;15(4).
11. Flanagan EP. Shoulder press from lunge position. Strength & Conditioning Journal. 2008;30(1):77–9.
12. Vishen PK, Sen S. Comparision of dynamic push-up training and plyometric pushup training on upper body performance test in cricket Player. Int J Phys Educ Sports Health. 2015;2(1):199-203.
13. Sharma D, Sharma S, Meena RK, Kumar S, Ahmad S. Impact of Two Grip Strengthening Exercise Protocols on Grip Strength of Non-Dominant Hand. Indian Journal of Public Health Research & Development. 2020 Jul 30;11(7):231-6.
14. Swanik KA, Lephart SM, Swanik CB, Lephart SP, Stone DA, Fu FH. The effects of shoulder plyometric training on proprioception and selected muscle performance characteristics. J Shoulder Elbow Surg. 2002 Nov-Dec;11(6):579-86. doi: 10.1067/mse.2002.127303. PMID: 12469083.

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Deep Squating Posture will be Influenced by Intrinsic Factor apart from Passive Ankle Dorsiflexion Range of Motion

Mohammed Aslam

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Mohammed Aslam/Deep Squating Posture will be influenced by Intrinsic Factor Apart from Passive Ankle Dorsiflexion Range of Motion/Physiotherapy and Occupational Therapy Journal. 2023;16(4): 179-185.

ABSTRACT

A total of 50 subjects participated in the study. The study was conducted in the department of Physiotherapy, Uttaranchal (PG) College of biomedical sciences and Hospital, Dehradun. The subjects were recruited from Uttaranchal (PG) College of biomedical sciences and Hospital Dehradun. Subjects were chosen as per the inclusion and exclusion criteria and informed consent should be obtained from all of them. After explaining the procedure, the subjects were assessed and divided into two groups possible squatting group and impossible squatting group. The subjects were asked to sit in the deep squatting posture with their heel down and arm Crossed and maintain the posture for more than 5 second and they were divided into 2 groups. Two points to be kept in mind while squatting were as follows: (a) Both the knees and feet should be brought together to the maximum possible extent throughout the deep squat and (b) The thigh and calf should be in contact with each other. The subjects were divided into two groups possible squatting and impossible deep squatting groups. The possible deep squatting group can be described as those who can performed the squatting i.e, both the knee and feet should be brought together to maximum possible and the thigh and calf should be in contact with each other and maintain these posture more than 5 second whereas impossible deep squatting group can be described as those who cant performed to contact calf and thigh while squatting. shows the deep squatting posture. The following parameter were measure in two groups, *The straight leg raise (SLR), The Heel-buttock distance (HBD), The modified finger floor distance (MFFD), The modified Thomas tests, Ankle dorsiflexion flexibility*. To examine the possible differences between the two squatting groups regard to each test parameters the Mann-Whitney u test (if the distribution of the data is not normal) was used. The dependent variables for the deep squatting posture were analyzed by step wise linear discriminate analysis to determine their relative importance for differentiating between the two groups. The dependent variables for the deep squatting posture are hip flexibility, knee flexibility, trunk flexibility, flexibility of hip and pelvis and ankle dorsiflexion flexibility. The possible deep squatting group shows increase in ankle dorsiflexion flexibility than the impossible deep squatting posture. Thus deep squatting posture is easy and objective method to measure the ankle joint dorsiflexion flexibility.

Keywords: Heel-Buttock Distance; Straight Leg Raise (SLR); Modified-Finger Floor Distance; Modified Thomas Tests; Ankle Dorsiflexion Flexibility.

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INTRODUCTION

Squatting is one of the posture patterns under the influence of traditional lifestyle in Asian countries. Asian workers typically adopt their job in prolonged squatting postures in various fields to handle objects on the ground in furniture assembling, agriculture, metal we welding and trimming, shoe making, homemade food industries and Indian toileting etc.[8,23] The deep squatting posture can be described as a sitting posture with dorsiflexed ankles, deeply flexed knees and hips and a flexed torso with shoulder occasionally resting on the knee. The ability to perform the deep squat requires closed kinetic chain of dorsi-flexion of the ankles, flexion of the knee and hip, extension of thoracic spine as well as flexion and abduction of shoulder. Poor performance of the deep squat test can be the result of several factors such as limited mobility in the lower poor close kinetic chain dorsiflexion of the ankle, poor flexion of knee and hips.[8] Adequate flexibility in ankle dorsiflexion is necessary for normal performance of functional activities such as maintenance of gait, walking, running, stair climbing and rising from a chair and squatting.[23] Limitation of ankle dorsiflexion is associated with gait parameter and balance function. In addition, it is considered to be risk factors of falls for older people and sports injuries in healthy male. Restricted ankle dorsiflexion has also been implicated as a Contributing factors in overuse injuries of the lower limb and foot.[13] Limited ankle dorsiflexion produces significant shifts in the distribution of plantar pressure during gait. In particular, it was found that pressure was shifted laterally and dwelled for more time in the forefoot rather than the heel.[27] The ankle is the most injured joint of the musculoskeletal system, lateral sprains being the main dysfunction, affecting one in every 10,000 individuals in the entire World, corresponding to 80% of ankle joint dysfunctions.[24] The ankle dorsiflexion movement is necessary for functional performance, principally for gait. It is considered that about 10% of this movement is necessary during the medium support phase of gait.[12,24] During the normal gait, about 10 degree of dorsiflexion is needed during the stance phase and toe-off. The ankle dorsiflexion of more than 10 degree when going downstairs, kneeling and in many sports activity.[17] The ankle strategy has been shown to contribute to postural stability also. The ankle strategy works as an inverted pendulum action and is elicited by the activation, in a distal to proximal recruitment pattern of anterior muscle of lower limbs and trunk to overcome a posterior displacement of the body or activation of the posterior muscles of the lower limbs and trunk to over come an anterior perturbation limited ankle joint dorsiflexion has been associated with many overuse injuries of the lower extremity, including plantar fasciitis, Achilles tendinopathy, shin splints, iliotibial band syndrome, and patellofemoral pain syndrome.[14] A loss of ankle dorsiflexion has also been implicated as a risk factor for recurrent ankle sprain. Dorsiflexion range of motion can potentially be limited by tightness in the muscles that plantar flex the ankle, particularly the gastrocnemius and soleus, capsular and soft tissue restrictions, loss of normal posterior glide of the talus in the mortise, and loss of other accessory motions at the tibiofibular, subtalar, and midtarsa joints.[5] Recent studies also implicated that limited passive dorsiflexion (DF) range of motion (ROM) and increased passive ankle stiffness as key factors contributing to increased plantar loading. The degree of ankle joint dorsiflexion that is sufficient varies from individual to individual depending on factors such as type of daily activities, heel height of shoes, and structure of the forefoot.[25] Therefore maintenance of strength of the dorsiflexion muscle as well as adequate of movement is necessary to allow efficient force generation and balance strategy execution to prevent a fall. Functionally available dorsiflexion range of ankle range of movement motion is different depending on whether the knee is allowed to bend or kept straight.[9] In most instances of daily activity the knee is bend and the body weight is born through the feet or floor to contact is occurring when large range of dorsiflexion are required to enable activity. Two specific functional activities that rely on ankle dorsiflexion range being substantial include sitting down and standing up from a seat and ascending and descending stairs. During both these activities, stability can be lost if insufficient range of dorsiflexion is available and a fall might result. The measurement method described herein is expected to enable the production of risk factor, thus leading to the prevention of the risk of falls, sports injuries etc. However, it is necessary to clarify the influence of anthropometric characteristics and the flexibility of other joint on the ability to adopt the deep squatting posture. The anthropometric characteristics like body height, body weight and BMI were included.

METHODOLOGY

Sample: A total of 50 subjects participated in the

study. The study was conducted in the department of Physiotherapy, Uttaranchal (PG) College of biomedical sciences and Hospital, Dehradun. The subjects were recruited from Uttaranchal (PG) College of biomedical sciences and Hospital Dehradun.

Inclusion Criteria

- 50 normal healthy individual males.
- Age - 18 to 25 years.

Exclusion Criteria

- History of fracture of lower extremities in last 6 month.
- History of dislocation/subluxation hip, knee and ankle joints in last 6 months.
- History of any joint pathology of hip, knee and ankle joints in last 6 months.
- History of any soft tissues damage or tearing in the lower extremity in the last observational study.
- Any spasm/tightness in lower back muscle.

Study Design: Observational

Instrumentation

- Measurement tape/flexible metal tapes usein centimeter (cm)
- Universal Goniometer
- Half circle Goniometer
- Standard Weight Machine
- Use in Kilogram (kg)
- Staircase

Protocol

Subjects were chosen as per the inclusion and exclusion criteria and informed consent should be obtained from all of them. After explaining the procedure, the subjects were assessed and divided into two groups possible squatting group and impossible squatting group.

Procedure

The subjects were asked to sit in the deep squatting posture with their heel down and arm Crossed and maintain the posture for more than 5 second and they were divided into 2 groups. Two points to be kept in mind while squatting were as follows: (a) Both the knees and feet should be brought together to the maximum possible extent throughout the deep squat and (b) The thigh and calf should be in contact with each other. The subjects were divided into two groups possible squatting and impossible deep squatting groups.

The possible deep squatting group can be described as those who can performed the squatting i.e, both the knee and feet should be brought together to maximum possible and the thigh and calf should be in contact with each other and maintain these posture more than 5 second where as impossible deep squatting group can be described as those who can't performed to contact calf and thigh while squatting shows the deep squatting posture. The anthropometric characteristic of the subject and girth of thigh and calf and the flexibility and movement range of the lower extremities of subjects were tested. The anthropometric characteristic includes body height, body weight and BMI. It is necessary to measure the flexibility of each joint of the lower extremities in deep squatting posture. Therefore items reflecting the flexibility of each joint were measured by specific tests.

The straight leg raise (SLR) tests were used to measured *hip flexibility.* In the SLR test, the subjects leg with the knee held straight were raised parallel to the edge of the table with the subject in supineposition and hip flexion angle were measured. The goniometer was placed with the stationary arm parallel to the edge of the table, the moving arm along the lateral midline of the thigh and the axis over the superior half of the greater trochanter.

The Heel-Buttock Distance (HBD) tests were measured as an indicator of *knee flexibility.* The HBD is the distance between the heel and buttock. The subjects were placed in the prone position and HBD was measured using a tape measure with subjects knee passively bent.

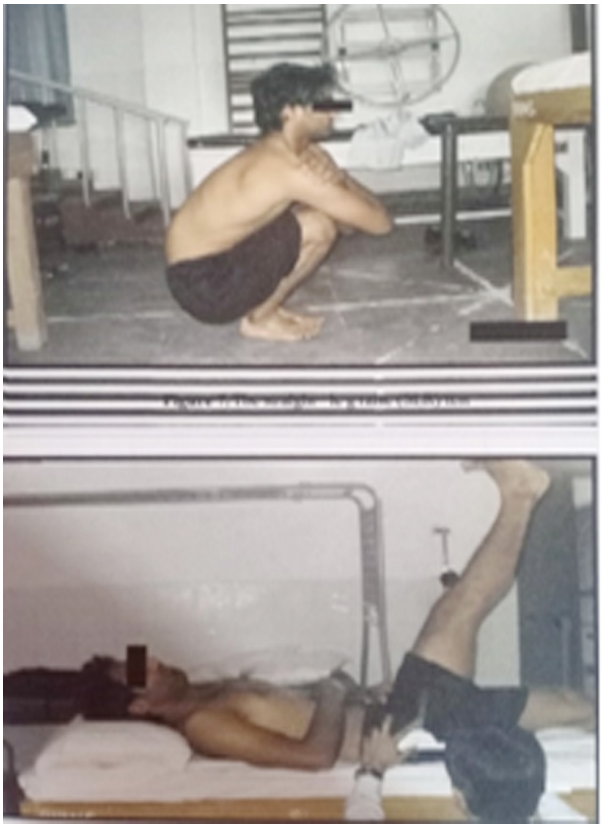
The Modified-Finger Floor Distance (MFFD) were measured as an indicator of *trunk flexibility.* The MFFD is the distance between the fingertips and the top of stool when the subjects bend in an upright standing position and extends his figures toward the floor while standing on a stool.

The Modified Thomas Tests were used to measure the *flexibility of hip and pelvis.* In modified Thomas test, the subjects were sitting at the end of the plinth and held both knees to the Chest. The subject held one leg in maximal hip flexion with his arms, while the tested limb was lowered toward the floor. Flexibility was determined by measuring hip flexion angle.

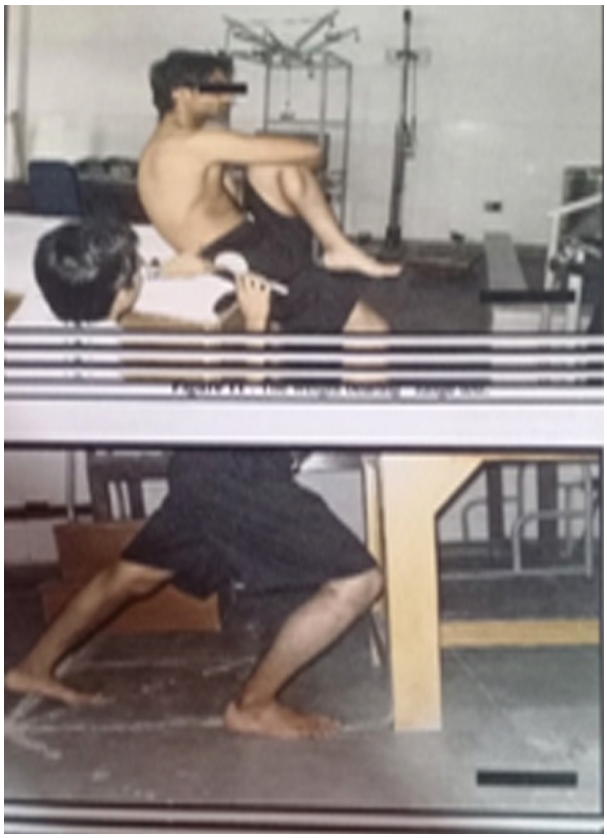
Ankle dorsiflexion flexibility were measured using the weight bearing lunge test. A weight bearing lunge is the distance between the tip of the big toe and wall when the subject lunges toward the wall. It was measured with tape measure placed on the floor. Physiotherapists commonly use aweight bearing lunge test to assess DF at the ankle. For this test, the patient is required to place their foot perpendicular to a wall and to lunge their knee toward the wall. The foot is progressively moved away from the wall until the maximum range of ankle dorsiflexion is reached without the heel lifting. The most frequent measurements taken at this point arethe distance from the foot to the wall. The benefits of the DF lunge test are that it is cost and time efficient, requires minimal equipment and is performed in weight bearing. The latter is particular advantage as the torque applied to the ankle is many times greater than that applied by non weight bearing methods and hence the resulting measurement may be more indicative of the range available for functional tasks. On the negative side, the test cannot be performed on patients for whom weight bearing is contraindicated.[13]

To examine the possible differences between the two squatting groups regard to each test parameters the Mann-Whitney u test (if the distribution ofthe data is not normal) was used. The dependent variables for the deep squatting posture were analyzed by step wise linear discriminate analysis to determine their relative importance for differentiating between the two groups. The dependent variables for the deep squatting posture are hip flexibility, knee flexibility, trunk flexibility, flexibility of hip and pelvis and ankle dorsiflexion flexibility.

The Deep Squatting posture



The Heel to buttock distance test and The Modified finger floor Distance (MFFD) test



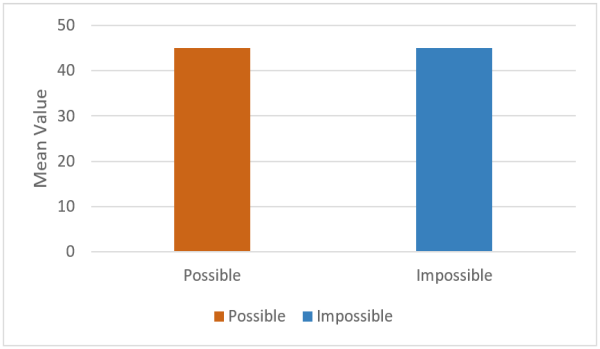
The modified Thomas test and The weight bearing lunge test

RESULT

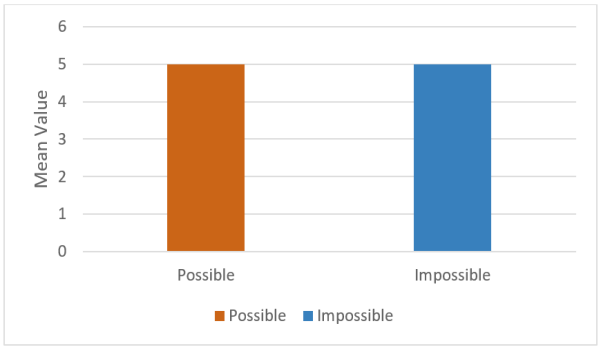
The data was analyzed for the 50 participants, 25 were belongs to the possible squatting groups, and there maining 25, to the impossible group.

Possible squatting groups had mean and SD value and impossible squatting groups had mean and SD value. Both groups had U value and Significance.

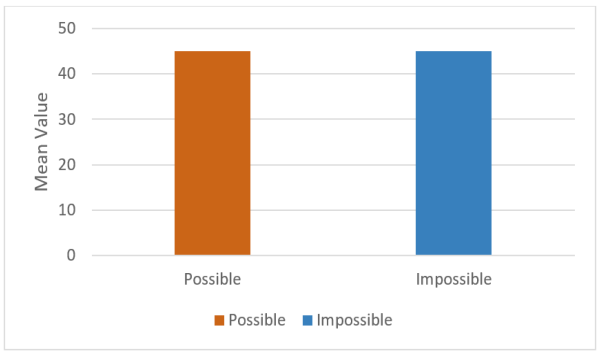
Comparison of all the variable between possible and impossible squatting groups.



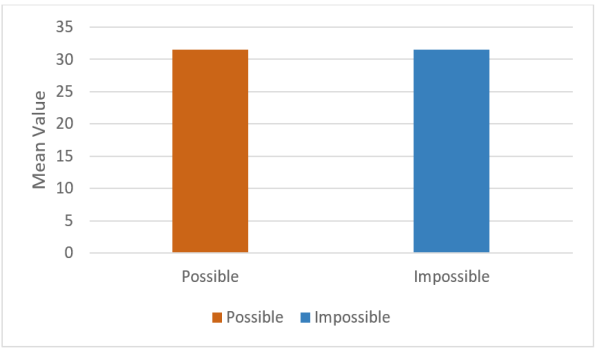
Graph 1: Comparison of mean values for RGT between Possible and Impossible Group



Graph 2: Comparison of mean values for FFDT between Possible and Impossible Group



Graph 3: Comparison of mean values for LGT between Possible and Impossible Group



Graph 4: Comparison of mean values for LGC between Possible and Impossible Group

Age: 22.4 1.6922.00 1.65 -.076 P>0.05.

Height: 163.91 5.45 164.0 4.80 -2.04 P>0.05.

Right modified thomas test left modified thomas test finger to floor distance test right weight bearing lunge test left weight bearing lunge test impossible deep squatting groups U value Significanc SD.

Weight 53.71 3.88 57.20 3.84 -3.043 P>0.05.

BMI 20.50 1.26 21.25 1.37 -2.156 P>0.05.

Right girth of thigh 44.6 4.06 44.76 3.19P>0.05.

Left girth of thigh 44.41 4.04 44.49 3.07- .398 P>0.05.

Right girth of calf 31.67 1.84 31.74 1.82- .495 P>0.05.

Left girth of calf 31.52 1.90 31.61 1.79 - 233 P>0.05.

Right SLR 72.61 4.48 72.60 5.49 - 136 P>0.05.

Left SLR 72.53 4.2272.40 5.64.126 P>0.05.

Right heel buttock distance 4.70 0.98 7.72 0.90 -5.972 P>0.05.

Left heel buttock distance 4.61 1.09 7.61 1.09 -5.834 4.80 .204 P>0.05.

Right modified thomas test 10.87 1.50 11.32 1.53 -1.090 P>0.05.

Left modified thomas test 1010.77 1.20 11.20 1.36 -942 P>0.05.

Finger to floor distance test 4.98 2.44 4.81 2.15 -.058 P>0.05.

Right weight bearing lunge test 13.5. 1.11 8.99 0.68 -6.073P>0.05.

Left weight bearing lunge test 12.81 1.07 8.87 0.64 -6.067 P>0.05.

DISCUSSION

In the present study 50% of the subjects could

not maintained the deep squatting posture. G. Katherisan *et al.* reported that approximately 22.5% of their Malaysian healthy individual male could not maintain the deep squatting postture. Various researches state that the ability to adopt the deep squatting posturerelated to the ankle dorsiflexion flexibility.[23] However, since the deep squatting posture has also been shown to relate to the anthropometric characteristics and flexibilities of the other joints. It was necessary to determine the factors that influence the deep squatting posture. Therefore, we aimed to determine the intrinsic factors that influence the deep squatting posture on the measurements of ankle dorsiflexion. The discreminent analysis conceptually revealed that the deep squatting posture is significantly correlated with ankle dorsiflexion, knee flexibility, body weight and BMI but ankle dorsiflexion is most significantly correlated with the deep squatting posture than the other dependent variables, the increase in the ankle plantar flexion moment with increase in the anteversion angle of the shank (i,e ankle dorsiflexion) is the most influential factors for the deep squatting posture. The ankle plantar flexion moment causes frontrotation of the shank and help to stabilize the center of gravity, thus enabling the maintenance of balance. In particular, ankle dorsiflexion flexibility is significantly correlated with maintenance of a stable deep squatting posture. Ankle dorsiflexion is also significantly correlated with the maintenance of the squatting knee flexion. Furthermore, body mass index (BMI) was found to be correlated to the maximal knee flexion during squatting[23] In the present study, we instructed the subjects on the positioning of the foot, and only movement in the sagittal plane was allowed. We think that lowering the degree of freedom of the lower extremities lead to the moderate discrimination percentage obtained by this evaluation method. In order to maintain balance in the case of the limitation of the ankle dorsiflexion, it is necessary to move the center of gravity forward by compensating with trunk and hip joint flexion. However, in this posture, it is impossible to keep the thigh in contact with the calf. Thus, limitation of ankle dorsiflexion makes it impossible to adopt the deep squatting posture. The hypomobility of the ankle dorsiflexion can be observed during the deep squatting posture if the heel of the foot rises while descending from the neutral starting position, the subject may have weak, tight lateral gastrocnemius, hamstring, weak inner thighs, and is at risk for achilles tendonitislf the knee drift inward shows the subject has weak glutes, tight inner thighs and is prone to knee and low back problem. lf the patients back bend into flexion while performing the deep squat, it may mean they have tight hip flexors, a weak core and poor posture. The lumbar spine may be more flexible relative to the hips in flexion due to lengthene derector spinae and short hamstring, this can lead to a hamstring straighten lack of mobility in the thoracic spine during the deep squat, the patient may inability to get the dowel directly over the feet and the armway out in the front of the feet. Body weight is associated with the deep squatting posture only to sligh textent. BMI (body mass index) was found to be correlated to the maximal knee flexion during the squatting. A smaller BMI indicates less soft tissue to restrict motion in deep knee flexion. Body weight and BMI are strongly related. We think that increase of body weight also influences the knee flexion, thus making it impossible to keep the thigh in contact with the calf and to adopt the deep squatting posture.Limitation of ankle dorsiflexion is associated with gait parameters during heel strike and balance adopts function. In addition, it is considered to be a risk factor of falls for the elderly and sports injuries in healthy malès Therefore, the measurement method described above is expected to enable the prediction of the risk factor, thus leading to the prevention of falls, sports injuries, etc. Restricted ankle dorsiflexion has also been implicated as a Contributing factors in overuse injuries of the lower limb and foot the method does not require any specific instrument, meaning that the skill level and the experience of the evaluator were not significant for the measurements. This studydescribed an easy and objective measurement of ankle dorsiflexion for physical therapy practices and coaches and assessment of the deep squat provides analysis of stability and mobility[11] and flexibility of lower extremities.

CONCLUSION

The possible deep squatting group shows increase in ankle dorsiflexion flexibility than the impossible deep squatting posture. Thus deep squatting posture is easy and objective method to measure the ankle joint dorsiflexion flexibility.

Clinical Significance

Since we found that there is significant difference in ankle dorsiflexion flexibility between the possible and impossible deep squatting posture. So there is increased in ankle dorsiflexion flexibility in possible deep squatting posture than the impossible deep squatting posture.

Limitations

The subjects recruited in our study consisted of normal healthy individuals males that were considered normal. Factors such as the subjects who have restricted range of motion and musculoskeletal disorder in lower extremities in last 6 months may affect the reliability of the measurements there fore the results of our study can be applied only to the normal healthy individual males and the test cannot be performed on the subjects for whom weight bearing is contraindicated.

Future Research

The study can be done on people of both sexes belonging to the different races the study can be done on old ages groups. The study can be done on the certain condition after the physical therapy. The study can be done on the people with diabetes mellitus.

REFERENCES

1. A Hemmerich, H Brown, S Smith, S.S.K. MArathandam, U.P Wyss: Hip, knee, ankle kinematics of highrange of motion activities of dily living. Journal of orthopaedic research: 25 october 2005.
2. Amol Saxena, DMP AND Will Kim, DMP; Ankle dorsiflexion in adolescent athletes: journal of American podiatricmedical associati 2003, volume 93 number 4321-314.
3. Andra Bagus Sriwarno, Yoshihiro Shimomura, KoichiIwanaga, AND Tetsuo Katsuura; The evaluation of effect of stool height alteration on workload of squatting posture performed by Indonesian with different body mass index. humanergol: 20 december 2006, volume 35:31-390.
4. Cha ng-yuHsier, Joan M. Walker, and katie Gillis; Straight leg raising test comparison of three instruments. September 1983, volume 63/number 9.
5. Craig R. Dineger, Jay Harteland Jose Fonseca; The effect of lateral ankle spta in on dorsiflexion range of motion, posterior talarglide, and joint la xity. Journal of Orthopaedic and Sport physical therapy April 2002; volume 32/ number 4.
6. Cunningham, Don H. Paterson, Peter A. Rechnitzer and John J. Koval; Age and sex effects on the mobility of the human ankle anatoie ontological society of america oxford journals; 28 june 1991 (abstracts).
7. Emika Kato, Toshiaki Oda, Kentaro Chino, Toshiyuki Kurihara, Toshihiko Nagayoshi, Tetsou Fukunaga and Yasuo Kawakami; Musculotendinous factors influencing difference in ankle joint flexibility between woman and me. International journal of sport and health science; 23 may 2005, volume 3, 74 218-225.
8. GKathiresan, N. Jali, N. Rhyhanafiqah, N. Azila Aznie, N. FIdieyana and N.Osop: The relationship between ankle joint flexibility and squatting knee flexion posture in young malaysian men. World journal of sport science.2010 volume 3:226-230.
9. Jennifer C. Nitz, Nancy Low Choy; The relationship between ankle dorsiflexion range, fall and activity level in women aged 40 to 80 Meears. zealand J. of physiotherapy; november 2004.
10. Jennifer L Kneating, Clair Parks and Merilyn Mackenzie; Measurement of ankle dorsiflexion in strock subject obtain using standardised dorsiflexion forea Australean J. of physiotherapy. 2006, volume 46.
11. Jeffrey Tucker; Overhead deep squatting: Understanding movement and function. Dynamic Chiropractic; 28 september 2006, volume 24.
12. John Weir and Nachiappan Chockalingam; Ankle joint dorsiflexion: assessment of the true values, 31 july.
13. Kim Bennell, Richard Talbot, Henry Wajswelner, Wassana Techovanich and David Kelly: Intra-rater and Inter-rater reliability of a weight- bearing lunge measure of ankle dorsiflexion. Australian physiotherapy,1998, volume 44.
14. Marei Johnson, Jennifer Baer, Holly Hovermale and Phouvy Phouthavong: Subtalarjoint position during gastrocnemius stretching and ankle dorsiflexion range of motion. Journal of athletic training; 2008 volume 43(2):172-178.
15. Margaret Schenkman, Richard A berger, Patrick O Rlly, Robert Wmann and 75 DI.

Review Article

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Pressure Ulcer: Review Article

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ABSTRACT

This article look into the etiopathogenesis, assessment, prevention and management of pressure ulcer. It also covers the role of pressure release devices and newer treatment methods in healing process of these wounds. Pressure ulcers occur from friction and shear and are progressive. It is usually found in bedridden and immobile people. Spinal cord injury patients have loss of sensation which adds on the problem. Pressure ulcers are preventable usually and based on severity management changes.

Keywords: Pressure Ulcer; Reconstruction; Hyperbaric Oxygen Therapy; NPWT.

INTRODUCTION

Pressure ulcer develop when there is prolonged pressure on a specific area of the skin, typically over bony prominences, such as the hips, heels, sacrum, and elbows. These sores can be particularly problematic for individuals with limited mobility or those who spend muchtime in a bed or wheel chair. According to severity, pressure sores are categorized from Stage I (mild) to Stage IV (severe). Reconstruction becomes necessary in more advanced stages where there is significant tissue damage, including muscle and bone involvement. The goals of pressure ulcer reconstruction include promoting healing, preventing infection, and restoring function and appearance. Pressure sore reconstruction refers to the surgical or medical procedures aimed at repairing and restoring tissues damaged by pressure sores, also known as pressure ulcers or bedsores. The common approaches to pressure sore reconstruction are debridement, flap cover, skin grafting, Negative Pressure Wound Therapy (NPWT) and rehabilitation.

Pressure ulcers are a type of injury that breaks down the skin and underlying tissue when a constant pressure is applied for a certain period resulting in tissue ischemia, loss of nutrition and oxygen supply to the tissues, and finally tissue necrosis. "Pressure ulcers" is a term used widely in many countries and has been accepted as a Europe wide term by the European Pressure Ulcer Advisory Panel (EPUAP). They are also known as 'bedsores', 'decubitus ulcers'. The word 'decubitus' derived from the Latin 'decumbo' or 'decumbere', meaning 'to lie down' or 'recline',since the ulcer occur commonly over areas of bony prominences

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in recumbent position, e.g., the sacrum, trochanter, heel, and occiput. The term 'pressure ulcer' describes these ulcers better with pressure as an important etiologic factor.

The site of pressure ulcer depends upon posture. Common sites of pressure ulcer in the supine position are the occiput, scapula, olecranon, sacrum, and heel;. In the lateral position are the ear, acromion process, greater trochanter, lateral condyle of femur, and lateral malleolus and in prone position are zygoma, acromion process, female breasts, pubis, patella, metatarsal over distal foot dorsum, and toes. In the sitting position sites are the shoulder blades, lower back, sacrum, ischial tuberosity, and heel.

Etiopathogenesis

Normally intracapillary pressure at the arterial end is 30–40 mmHg.[1] Microcirculatory occlusion occurs beyond this pressure and this, in turn, initiates a downward spiral toward ischaemia, tissue death and ulceration.[2,3] Compression of soft tissue occurs and shearing of tissue occur between be or chair an tissue, when the person is sitting or lying, or because something is pressing into the body, such as a shoe, a prosthesis, a surgical appliance or clothing elastic. Blood vessels within the distorted tissue are compressed, angulated or stretched out of their usual shape and blood is unable to pass through them.[4] This causes tissue

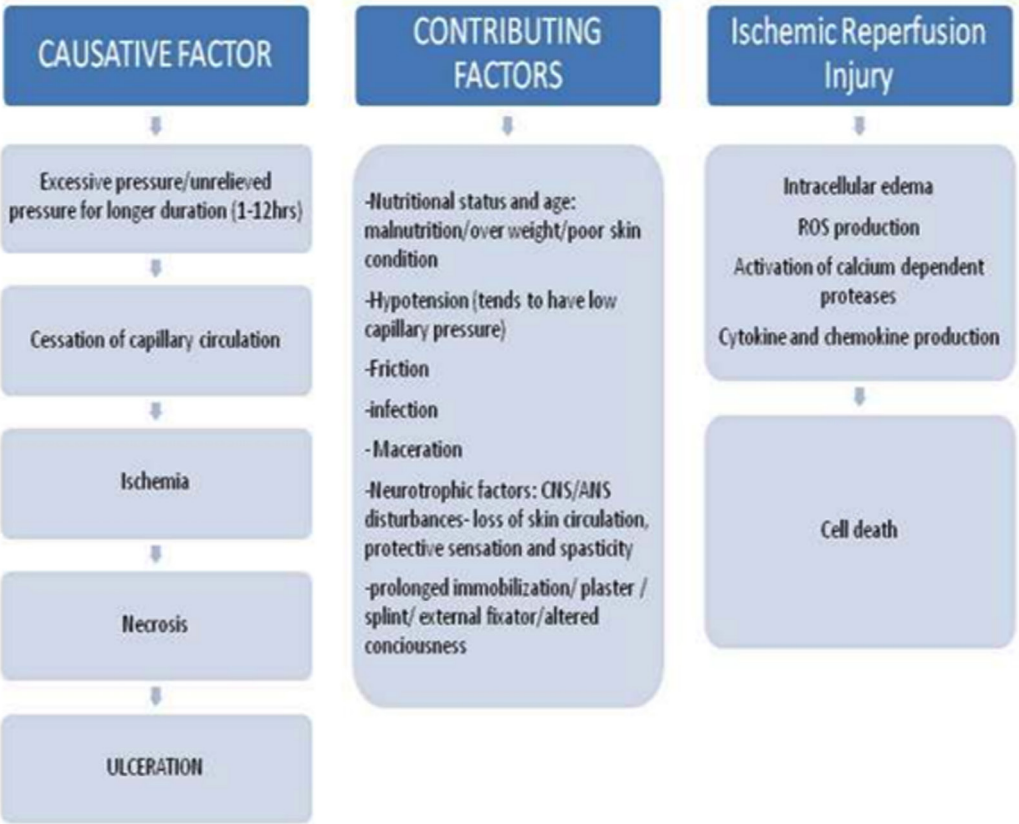

Fig. 1: Etiopathology of Pressure Sore

ischaemia. It also obstruct lymphatic flow, leading to the accumulation of metabolic waste products, proteins and enzymes in the affected tissue. (Fig 1).

1. *Pressure*

When constant pressure is applied, soft tissues change themselves to accommodate the external shape. This is known as tissue creep.[5] It decreases the external pressures and also exaggerate internal changes of soft tissues that again reduce the vascular supply of already compromised areas due to vascular kinking. If ischemia persists for 1-2 hours, necrosis takes place and pressure ulcers occurs.[6] Due to prolonged and constant pressure, the chances of skin atrophy with thinning of this protective barrier, make the skin more susceptible to minor compression. The height of the available tissue cover over the bony prominence is not the only determining factor for developing pressure sores. Although the covering of sole of foot is soft tissue, they have a vasculature is can with

stand considerable forces. On the sacrum and ischial tuberosity on the other hand, although there is a relatively thick soft tissue cover and a wide supporting surface, the blood vessels are not meant for weight bearing, so even with fairly light compression, pressure ischemia can develop rapidly. Hence, the soles of feet do not develop pressure sores even after prolonged weight bearing in ambulatory patients unless there are underlying causes making them insensate and more prone to pressure damage. The pressure points on various positions are mentioned in Fig. 3.

2. *Shear*

Shearis considered to be more significant than

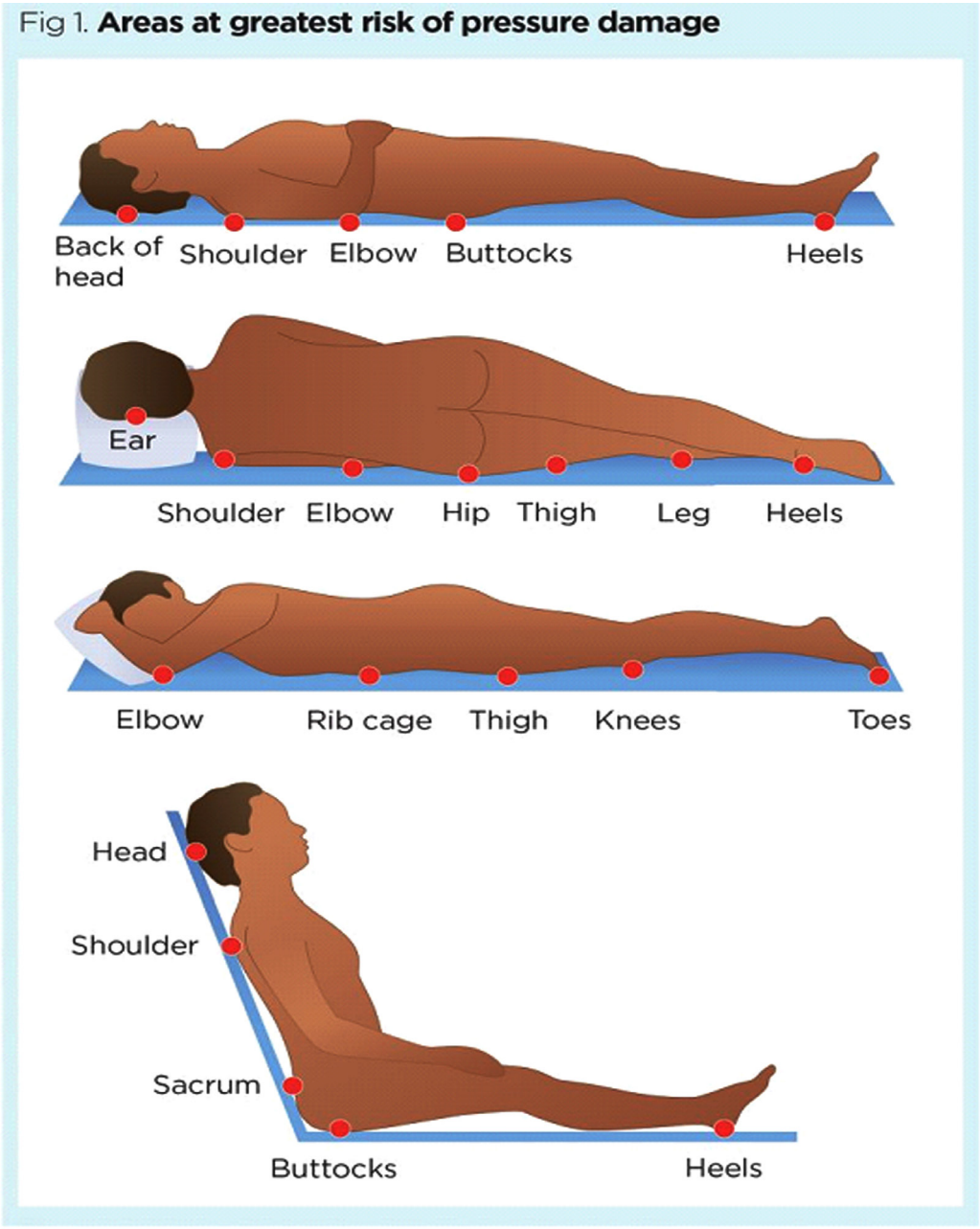

Fig. 3: Pressure Points

pressure in the causation of pressure ulcers.[7] Ischial tuberosities, heels, shoulder blades, and elbows are more prone for shear forces. These are areas on which the body is frequently supported when in a position (such as sitting or lying semi-recumbent) which allows forward slide. Superficial pressure ulcers caused by shearing tend to have an uneven appearance.

3. *Friction*

Friction, along with pressure and shear is also

found as a cause of pressure ulcers.[8] Friction can cause pressure ulcers both indirectly and directly. In the indirect sense, friction is necessary to generate the shearing forces. Shear and friction will act together and causes skin breakdown.

4. Immobility

Immobility alone does not cause pressure ulcers, but in the presence of other factors it can cause them. If the senses are intact, immobility will not lead to pressure ulcers, as the patient can communicate easily. Conversely, comatose patients, even with intact sensation, may develop pressure ulcers because they cannot communicate the pain of an elevated pressure threshold. Tissue ischemia causes pain, so these patients often ask to change their position. Patients with orthopedic casts should be encouraged to report any discomfort and pain to avoid iatrogenic pressure ulcers. Tissue deformation leads to ischemia, increases exercise resistance to reduce stress, and promotes vascular function to restore blood flow to the affected area. These defensive moves are often the result of people not realizing they are making them. However, if these emergency interventions are insufficient to reduce ischemia, the central nervous system is stimulated by discomfort and pain to ensure that pain treatment is provided without permanent damage. When the pressure drops and the blood pressure returns, local blood vessels begin to dilate and blood flow increases, this is called reactive hyperemia. As a result, bright red skin appears on the breast, often called erythema blanching because it is white, as opposed to the dark red non-blanching erythema that indicates tissue damage. Reactive hyperemia causes a rapid restoration of the balance of oxygen and carbon dioxide. It also removes waste products. Erythema disappears when the tissue returns to a resting state. Patients who cannot develop reactive hyperemia cannot recover from the stress of ischemic attacks, leading to tissue damage. Clinically, this manifests as white spots in areas of pressure areas that do not change color as quickly to red reactive occlusion as in healthy people. Instead, the white patches will last for several minutes and then gradually fade to a more normal skin color with little or no visible hyperemia.

5. Combined Pathology

When the reactive hyperaemia cycle stops to function adequately, a pressure ulcer will almost certainly develop. Predisposing factors for pressure ulcers are

- Loss of movement
- Failure of reactive hyperaemia
- Loss of sensation

6. Indirect Causes

a. Age-related physiological alterations can lower the threshold for pressure-induced injury in elderly patients.
b. Any condition that is associated with prolonged, impaired wound healing such as diabetes mellitus.
c. Any condition that is associated with a low tissue oxygen tension is a major cause of pressure ulcers. These include: Heart failure, atrial fibrillation, myocardial infarction, and chronic obstructive pulmonary disease.
d. Peripheral vascular disease.
e. Contractures and spasticity.
f. Loss of sensations, the pain signal that would normally cause an immobile individual to change position is lost.
g. Paralysis and insensibility with skin atrophy.
h. Nutritional conditions such as malnutrition, hypoproteinemia, and anaemia can cause significant delays in wound healing.
i. Moisture causes maceration, which predisposes the skin to injury.
j. Mental health conditions - people with severe mental health conditions such as schizophrenia or severe depression have an increased risk of pressure ulcers because of poor nutrition, associated conditions like diabetes or incontinence, poor personal hygiene.

Grading of Pressure Sore

Staging of Pressure ulcer may done using National Pressure Ulcer Advisory (NPUAP) Panel's Updated Pressure Ulcer Staging System pressure ulcer classification/staging system.[10,11] The staging system provides idea about the amount of anatomical tissue loss in a pressure ulcer. (Fig. 2)

1. Suspected Deep Tissue Injury

Deep tissue injury may be difficult to detect. Usually diagnosed by painful, firm, mushy, boggy, warmer or cooler tissue followed by persistent purple or maroon discolored intact skin or blood-filled blister at pressure point. The word "suspected DTI" may be added to the clinical diagnosis and staging.

2. Stage I Pressure Ulcer

It is diagnosed by intact skin with non-blanchable redness over pressure point. Dark skin people the

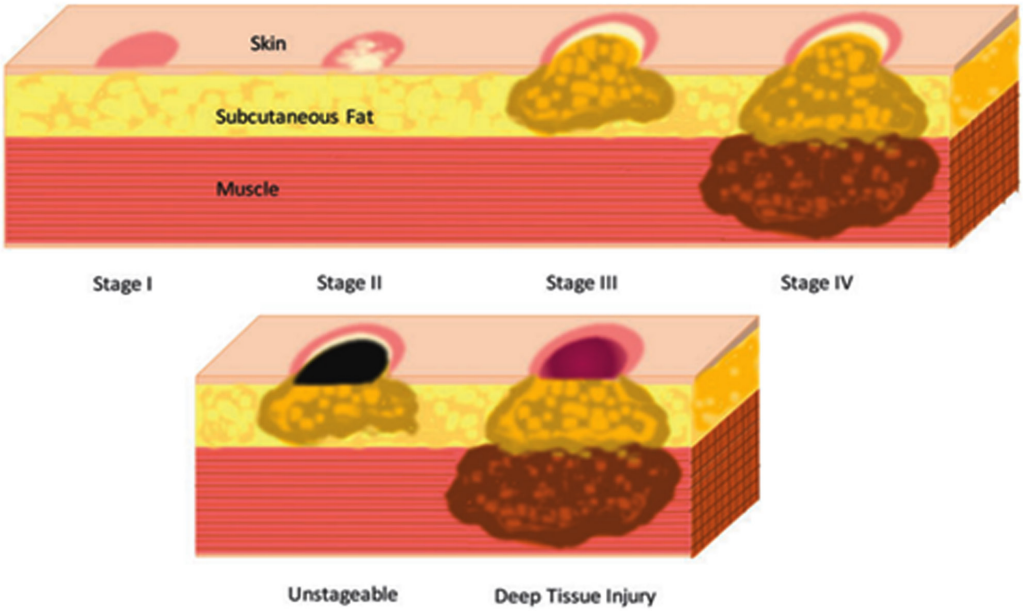

Fig. 2: Stages of Pressure Ulcer

color may be different than surrounding skin. It may be firm, warmer or cooler and painful.

3. *Stage II Pressure Ulcer*

It is characterized by a shallow ulcer with a red pink wound bed, without slough due to partial thickness loss of dermis. There may be an intact or open/ruptured serum filled blister. Surrounding skin may be shiny with tense skin due to subcutaneous fluid collection.

4. *Stage III Pressure Ulcer*

Subcutaneous tissue/fat is exposed with or without slough and/undermined edges due to full thickness loss of skin. Muscle, tendon, or bone, are not visible.

5. *Stage IV Pressure Ulcer*

Loss of skin and subcutaneous tissue with exposed bone, tendon, or muscle with or without slough and/undermined edges.

6. *Unstageable Pressure Ulcer*

Correct depth of tissue injury may not be possible as the base of the ulcer is covered by thick moist soft slough and/or dry tough eschar in the wound bed.

Risk Assessment

All patients admitted to hospital should be assessed for risk, including changes in mobility or treatment. There are many ways to measure risk. The Norton scale measures five categories, from a low of 1 to a high of 4: physical, mental, activity, mobility, and inactivity. A total score below 14 indicates a high risk of pressure ulcers.[12] The Braden scale (Table 3) is also similar, giving scores of up to 4 in the brush categories of hearing, sight, moisture, sports, play, nutrition and communication. A higher score means less risk.[13]

There are many bandages designed to cover high points such as the sacrum and heel, as well as bandages designed to wrap the injured body (especially the feet). However, it should be noted that some dressings can cause problems. For example, during the cutting process, pressure may increase on the edges of the support. There are individual beds (egg crate beds, sky sheep, etc.) that reduce the height of the large space.[14] Compared to cotton, silk is the best at preventing pain because it reduces friction and skin damage.[15]

Prevention

All patients who use dentures or require a wheelchair must be properly adjusted for proper fit and adequate padding. If there is a significant change in weight or body behavior that affects compliance, the application process must be repeated. Sweat, urine and feces can cause maceration of the skin, and if the skin covers the raised areas, the onset of the skin can be painful. Keeping the skin clean and dry is an important part of caring for at-risk patients. Even with sufficient padding, it is important to change position regularly, as even low pressure can cause pain in the long term.

The support area for pressure relief can be divided into static devices and dynamic devices. The device, which tends to distribute pressure over

***Table 3*:** Braden scale for predicting pressure sore risk

Severe Risk: Total score 9 *High Risk*: Total score 10-12 *Moderate Risk:* Total score 13-14 *Mild Risk*: Total score 15-18				Date of Assess				
Risk Factor	**Score/Description**				**1**	**2**	**3**	**4**
Sensory Perception Ability to respond meaningfully to pressure-related discomfort	1. *Completely Limited* – Unresponsive (does not moan, flinch, or grasp) to painful stimuli, due to diminished level of consciousness or sedation, OR limited ability to feel pain over most of body surface.	*2. Very Limited* – Responds only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness, OR has a sensory impairment which limits the ability to feel pain or discomfort over ½ of body	*3. Slightly Limited* – Responds to verbal commands but cannot always communicate discomfort or need to be turned, OR has some sensory impairment which limits ability to feel pain or discomfort in 1 or 2 extremities.	4. *No Impairment* – Responds to verbal commands. Has no sensory deficit which would limit ability to feel or voice pain or discomfort.				
Moisture Degree to which skin is exposed to moisture	1. *Constantly Moist*– Skin is kept moist almost constantly by perspiration, urine, etc. Dampness is detected every time patient is moved or turned.	*2. Often Moist* – Skin is often but not always moist. Linen must be changed at least once a shift.	*3. Occasionally Moist* – Skin is occasionally moist, requiring an extra linen change approximately once a day.	*4. Rarely Moist* – Skin is usually dry; linen only requires changing at routine intervals.				
Activity Degree of physical activity	*1. Bedfast* – Confined to bed. each shift in bed or chair.	*2. Chairfast* – Ability to walk severely limited or nonexistent. Cannot bear own weight and/or must be assisted into chair or wheelchair	*3. Walks Occasionally* – Walks occasionally during day, but for very short distances, with or without assistance. Spends majority of	*4. Walks Frequently*– Walks outside the room at least twice a day and inside room at least once every 2 hours during waking hours				
Ability to change and control body position	*1. Completely Immobile* – Does not make even slight changes in body or extremity position without assistance.	*2. Very Limited* – Makes occasional slight changes in body or extremity position but unable to make frequent or significant changes independently	*3. Slightly Limited* – Makes frequent though slight changes in body or extremity position independently.	4. *No Limitations* – Makes major and frequent changes in position without assistance.				
Nutrition Usual food intake pattern 1 NPO: Nothing by mouth. 2 IV: Intravenously. 3 TPN: Total parenteral nutrition	1. *Very Poor* – Never eats a complete meal. Rarely eats more than 1/3 of any food offered. Eats 2 servings or less of protein (meat or dairy products) per day. Takes fluids poorly. Does not take a liquid dietary supplement, OR is NPO1 and/or maintained on clear liquids or IV2 for more than 5 days.	*2. Probably Inadequate* – Rarely eats a complete meal and generally eats only about ½ of any food offered. Protein intake includes only 3 servings of meat or dairy products per day. Occasionally will take a dietary supplement OR receives less than optimum amount of liquid diet or tube feeding.	3. *Adequate* – Eats over half of most meals. Eats a total of 4 servings of protein (meat, dairy products) each day. Occasionally refuses a meal, but will usually take a supplement if offered, OR is on a tube feeding or TPN3 regimen, which probably meets most of nutritional needs.	*4. Excellent* – Eats most of every meal. Never refuses a meal. Usually eats a total of 4 or more servings of meat and dairy products. Occasionally eats between meals. Does not require supplementation.				

Table Cont...

Friction and Shear	1. *Problem* - Requires moderate to maximum assistance in moving. Complete lifting without sliding against sheets is impossible. Frequently slides down in bed or chair, requiring frequent repositioning with maximum assistance. Spasticity, contractures, or agitation leads to almost constant friction.	2. *Potential Problem* – Moves feebly or requires minimum assistance. During a move, skin probably slides to some extent against sheets, chair, restraints, or other devices. Maintains relatively good position in chair or bed most of the time but occasionally slides down.	3. *No Apparent Problem* – Moves in bed and in chair independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair at all times.
Total Score	Total score of 12 or less represents *High Risk*		

a wide area, contains bedding materials such as air, water, gel, beads, silicone, foam, and a fur pad. The electronic device eliminates long-term pressure on the anatomical area by changing the pressure under the patient. Many areas of support include: elevated bed replacement, airless bed, and smoke inhalation. Alternating bed pressure reduces bed pressure contact time by creating alternating high and low pressure conduits in the bed. Low Air Loss (LAL) beds allow patients to float in the warmth of heated air. Circulating air balances the patient's pressure and dries the skin.

Turn every 4 hours and use a special foam mattress to reduce the risk of pressure ulcers compared to turning every 2 hours using a pad. A cushion containing gel, foam, air or water can provide pressure relief. Studies have shown that the maximum subcutaneous pressure is within 2 cm of the ischial tubercle. The thicker the pad, the lower the subcutaneous pressure, the best pad is 8 cm. Pressure relief is provided to the patient and should be performed at least every 15 minutes while the patient is seated.

Protein intake is especially important for maintaining nitrogen quality, and vitamin/ mineral supplements are recommended for unfit patients. Prealbumin is used as a short-term test of nutritional adequacy. Albumin is also beneficial, but its long half-life means a better understanding of long-term nutrition.

Diagnosis and Treatment

Staging and documentation of wound size should be performed. Other examinations include location, condition of surrounding skin, presence of tissue undermining and tunneling, and amount of exudate, odor, and tenderness. The pressure ulcer healing scale (PUSH tool) is a commonly used tool developed by the NPUAP that scores pressure ulcers based on wound size, underlying tissue type, and amount of exudate (Table 1).

Table 1: PUSH tool for pressure assessment

Points	Area, cm^2 (Length x width)	Tissue Type	Exudate Amount
0	0	Closed	None
1	<0.3	Epithelial Tissue	Light
2	0.3-0.6	Granualtion Tissue	Moderate
3	0.7-1.0	Slough	Heavy
4	1.1-2.0	Necrotic Tissue	
5	2.1-3.0		
6	3.1-4.0		
7	4.1-8.0		
8	8.1-12.0		
9	12.1-24.0		
10	>24.0		

The Bates-Jensen Wound The Bates-Jensen Wound Assessment Tool assesses wounds according to size, depth, wound margins, tissue undermining, type and amount of necrotic tissue, type and amount of exudate, skin color, presence of edema, induration, granulation, and epithelialization.[16] Other tools such as a pressure ulcer status tool and the Sessing scale are also used.[17] Assessment and monitoring should be done in a careful and consistent manner. CT or MRI is used to assess the extent of tissue involvement and to determine if osteomyelitis is present. In the extremities, adequacy of perfusion should be assessed using the ankle-brachial index and vascular studies. A pressure ulcer patient should be thoroughly evaluated for associated myoneuropathy electromyography (EMG) and nerve conduction studies (NCS), nephropathy

(renal function tests), cardiopathy (lipid profile, ECG, and echocardiogram), and chest X-ray if indicated. Furthermore, the patient should be examined to rule out underlying morbidities such as anemia, hypoproteinemia, and diabetes. Once surgical intervention is planned, routine examinations for fitness for anesthesia and surgery such as hemoglobin, total and differential count, bleeding time, clotting time, PT/APTT/INR, blood grouping, blood sugar, microscopic examination of urine, liver tests (including total proteins and serum albumin), ESR, C-reactive protein, chest x-ray should be performed. Tissue culture and sensitivity (C/S) and C/S blood for bacteria and fungi, tissue biopsy (to quantify bacterial load may be performed as indicated. Biopsy may be indicated to rule out malignant changes in chronic long-term pressure ulcers).

The main treatment involves removal of the problematic source of pressure, adequate debridement of all areas of infection, devitalized tissue, and regular wound care to promote the healing process. The basic principles of surgical treatment of pressure sores remain essentially unchanged since they were enumerated in a report by Conway and Griffith more than half a century ago:

- Excision of the ulcer, surrounding scar, underlying bursa, and soft-tissue calcifications, if any.
- Radical removal of underlying bone and any heterotopic ossification.
- Padding of bone stumps and filling dead space.
- Resurfacing with large regional pedicled flaps.
- Grafting the donor site of the flap, if necessary.

1. Wound Bed Preparation

- Cleaning the wound and careful skin care are the most important parts of the treatment. The process involves removal of surface contamination and careful excision of all dead tissue. This is debridement. In addition to conventional surgical debridement, there are other types of debridement such as mechanical debridement which involves the use of repeated wet to dry dressings to remove deposits, enzymatic debridement using enzymes (papain-urea, collagenase, fibrinolysin, deoxyribonuclease) to liquefy dead tissue and remove it with dressings The literature also mentions biological debridement, or larvae, and larval therapy (in which the larvae eat all the dead tissue and clean the wound without damaging the living tissue). Worms also help fight infection by releasing substances that kill bacteria and stimulate the healing process.[18,19]
- Surgical debridement with a blade or scissors is the most commonly used and most effective method of debridement in skilled surgical hands. Some mechanical debridement techniques include:

Table 2: Types of Wound Dressings

Type of Dressing	Advantages	Disadvantages	Ideal wound
Aliginate dressing	Absorbent, infrequent changes	Expensive	Infected wounds
Foam dressing	Absorbrnt, provide padding	Expensive	Infected wounds, fragile surroundding skin, Stage I and for prevention
Gauze dressing	Inexpensive, microdebridement	Frequent changes	Large complex wounds with exudate or biofilm
Honey dressing	Mild antibiotic	Poor efficacy	Stage II with mild infection
Hydrocollod dressing	absorbent	Expensive	Wound with minimal discharge, Stage II and Stage III
Hydrogel dressing	Hydrating	Moves easily	Dry or dehydrated wounds, unifected grannulating wounds
Silver dressing	Antibiotic	prevents epithelialization	Infection wounds, remove once infection is cleared
Transparent film dressing	Barrier from bodily fluids, infrequent changes	Not porous, can rip skin on removal	Stage I, Stage II without exudate

- Cleaning and pressure irrigation – When removing dead tissue using high-pressure water jets.
- Ultrasound – Low frequency energy waves used to remove devitalized tissue.
- Laser focused beams of light are used.
- Debridement is basically done to convert a chronic wound into an acute wound so that it can go through the normal stages of healing.

Wound Dressings

The dressing used for different stages of wound healing is specialized for each stage. These are classified as non-absorbent, absorbent, debriding, self-adhesive and many others. Dressings are usually occlusive, so ulcers heal better in a moist environment. (Table 2) If the ulcer is clean and dry, occlusive dressings are usually changed weekly, and more frequent changes are avoided because dressing changes remove healthy cells along with debris. Contaminated or oozing wounds may require more frequent dressing changes, sometimes every few hours. Heavily contaminated ulcers are treated with negative pressure wound therapy (NPWT). Special dressings and bandages are used to protect and speed up the healing process of pressure ulcers. These dressings include:

- *Hydrocolloid Dressings:* These contain a special gel that encourages the growth of new skin cells in the ulcer and keeps the nearby healthy area of skin dry.
- *Alginate Dressings:* These are made from seaweed that contains sodium and calcium known to speed up the healing process. Honey impregnated alginate dressings are known to accomplish total wound healing to pressure ulcers.
- *Nano Silver Dressings:* These use the antibacterial property of silver to clean the ulcer.
- *Creams and Ointments:* To prevent further tissue damage and help speed up the healing process, topical preparations, such as cream and ointments are frequently used.

1. *Antibiotics*

Antibiotics are usually only prescribed to treat an infected pressure ulcer and prevent the infection from spreading. If tissue infection exists, antibiotics are necessary to treat the infection, but effort must be made to debride the ulcer thoroughly and leave all viable tissues only, otherwise antibiotics alone will not clean up the ulcer. Topical antibiotics should be avoided because their use may increase antibiotic resistance and allergy. Antiseptic cream may also be applied topically to pressure ulcers to clear out any bacteria that may be present.

2. *Negative Pressure Wound Therapy (NPWT)*

This is an invaluable tool in the management of pressure sores and involves the application of sub-atmospheric pressure to a wound using a computerised unit to intermittently or continuously convey negative pressure to promote wound healing. NPWT, is effective for deep, cavitating, infected and copiously discharging pressure ulcers, particularly with exposed bone. Its benefits include

- Assists granulation.
- Applies controlled, localised negative pressure to help uniformly draw wounds closed.
- Helps remove interstitial fluid allowing tissue decompression.
- Helps remove infectious materials and quantifies exudates loss.
- Provides a closed, moist wound healing environment Promotes flap and graft survival. Both hospital and domiciliary use.
- Reduces hospital/dressings/nursing cost (if we can discharge the patient to home).

3. *Newer Research*

Many products are available to aid wound healing but should be prescribed only under strict medical advice, as they still require further research to determine their effectiveness. These include:

- Growth factors and cytokines.
- Hyperbaric oxygen (HBO).
- Skin graft substitutes (bioengineered skin).
- Connective tissue matrix.
- Expanded epidermis.
- Epidermal stem cells.
- Bone marrow (BM) or adipose tissue derived stem cell (ASC) therapy.
- *Cytokines and growth Factors*

Chronic pressure ulcers show high levels of inflammation and disruption of the collagen matrix, along with increased apoptosis and decreased levels of growth factors and their receptors. Patients treated with GM-CSF or bFGF had higher levels of the respective cytokines after treatment.

After treatment with exogenous bFGF, the bFGF gene was upregulated, suggesting auto induction of the cytokine. Both cytokines and growth factors may play a major role in the treatment of pressure ulcers in the future.

- *Hyperbaric Oxygen Therapy*

Hyperbaric oxygen therapy (HBO) is used to treat pressure ulcers. The HBO chambers are fitted with specially designed devices equipped with a controlled pressure seal and automatic safety valves. A constant pressure of 22 mm Hg (1.03 atmospheres absolute) is maintained inside the chamber using pure oxygen at a flow rate of 2-8 L/ min with direct discharge to atmosphere.

a. It increases oxygen transport to wound area stopping further tissue damage.
b. It facilitates growth of new capillaries (angiogenesis) improving the microcirculation.
c. It speeds up wound healing by reducing inflammation and swelling.
d. It relieves pain.
e. It reduces infection by eliminating bacteria directly and increasing capacity of white blood cell to fight infection.
f. It improves microcirculation and elimination of toxins in the blood.
g. It enhances the effect of some antibiotics h. It stimulates the release of stem cells from the BM.
h. It decreases blood viscosity and risk of thrombosis and stroke.
i. It improves lymphatic circulation.
j. It improves bone density and mineralisation and speeds up bone healing.
k. l. It enhances peripheral nerve regeneration for improved sensitivity.
l. It prepares tissue and bone for grafting before surgery.
m. It speeds up healing after surgery and improves chances of graft survival.

- *Skin Substitutes (Bio-Engineered Skin)*

Cultured keratinocytes are used to treat various types of wounds.[20] For partial/full skin defects, cultured dermal substitute (CDS) is the most effective therapy. Cultured epidermal substitute and cultured skin substitute are also used as biological wound dressings. This artificial dermis induces angiogenesis and fibroplasia in deep, poorly vascularized tissue defects with less vascular invasion. However, it is difficult to apply a collagen matrix to pressure ulcers because they are usually accompanied by infection with the discharge of excessive amounts of exudate or pus and are generally exposed to external forces that prevent graft fixation. Allogeneic CDS effectively treats intractable ulcers, while BM cell implantation combined with allogeneic CDS is used in the treatment of severe ischemic ulcers.

- *Bone Marrow/Adipogenic Stem Cells*

"Cell therapy" is defined as a set of strategies that use living cells for therapeutic purposes. Such therapy aims to repair, replace or restore the biological function of the damaged tissue or

	Primary closure
Sacral pressure ulcer	Reverse dermal flap
	Inferiorly based random skin rotation flap
	Transverse lumbosacral arterial and randomLimberg flap
	Thoracocolumbar-sacral arterial /random flap
	Superior gluteus myoplasty
	Turnover gluteus myopathy
	Gluteus maximus musculocutaneous flap
	Gluteus maximus musculocutaneous island flap
	Gluteus maximus fasciocutaneous flap
	Gluteal fasciocutaneous rotation-advancement flap with V-Y closure
	Bilateral gluteus advancement flap
	Gluteus plication closure
	Sensory island flaps
	Gluteal thigh arterialized flap
	Expansive gluteus maximus flap
	Parasacral perforator-based musculocutaneous flap
	Parasacral peforator-based fasciocutaneous flap
Ischial pressure ulcer	Primary closure
	Biceps femoris musculocutaneous flap
	Random posterior thigh flap ± biceps femoris myoplasty
	Gluteal thigh flap
	Inferior gluteus maximus musculo plasty
	Sliding gluteus maximus flap
	Inferior gluteus musculocutaneous flap
	Tensor fasciae latae with vastus lateralis flap
	Interior gluteus musculocutaneous island flap
	Lateral thigh fasciocutaneous flap
	Gracilis musculocutaneous flap
	Anterolateral thigh fasciocutanous island flap
	Gracilis musculocutaneous flap (with sartorius as a double muscle unit)
	Rectus abdominis musculocutaneous flap
	Hamstring musculocutaneous flap
	Inferior gluteal artery perforator flap.

Table cont....

Trochanteric pressure ulcer	Anteriorly based random thigh flap Tensor fascia lata musculocutaneous flap (island) Random bipedicle flap Vastus lateralis myoplasty Tensor fasciae latae musculocutaneous flap Vastus lateralis musculocutaneous flap Tensor fasciae latae musculocutaneous flap (bipedicle) Gluteus medius tensor fasciae latae musculocutaneous flap Tensor fasciae lata emusculocutaneous flap V-Y advancement Distally based gluteus maximus flap Tensor fasciae lata emusculocutaneous flap (innervated) Gluteal thigh flap Expansive gluteus maximus flap.

organ. Bone marrow (BM) mononuclear cells can be easily obtained in large numbers of aspirates without extensive handling or culture before transplantation, and the cells can be transplanted directly without in vitro expansion. By using the whole mononuclear fraction, no potentially beneficial cell type is missed, and MNCs from the patient's own BM promote angiogenesis, which appears to be a key factor for optimal skin wound healing. The reparative functions of MSCs are thought to include the secretion of factors such as vascular endothelial growth factor or FGF, which could help prevent apoptosis, promote angiogenesis, aid matrix reorganization, and increase the recruitment of circulating MSCs. harvest Although this method is invasive and painful, it is effective in wound healing.

Reconstruction

If there is no microbial growth (especially Streptococcus haemolyticus, Methicillin-resistant Staphylococcus Aureus, Pseudomonas), no osteomyelitis, and the granulation is healthy, the wound can be considered for definitive repair and reconstruction according to the reconstruction ladder.

The advantages of single stage treatment of pressure ulcers include fewer anesthetic episodes, shorter hospital stay, earlier rehabilitation and lower costs. However, multistage treatment should be considered in patients who have pressure ulcers on the front and back of the trunk at the same time.

Surgical coverage options for pressure ulcers include primary closure, random skin flap/Limberg flap, myoplasty plus skin graft, pedicle muscle, myocutaneous, fascial, or fasciocutaneous flap, perforator flaps, free flaps, and tissue expansion. Flap selection depends on many factors such as ulcer location, level of spinal injury, history of previous ulceration and surgery, ambulatory status and potential, daily habits, educational status, motivation level, and associated comorbidities. The flap provides padding to the bony stumps and fills the dead space. Composite flaps increase durability. The flap should not interfere with the adjacent areas of the flap to preserve all future options for the flap cover of the second option. The suture line of the flap should fall away from the area of direct pressure. By planning large flaps, tension on the suture line is minimized. Possible loss of function and need for rehabilitation should be considered in ambulatory patients. For outpatients, an option such as a skin graft may also be considered. One can choose reconstructive option according to the site involved.

Post-operative Care

Measures like pressure relief, shear, friction, moisture, skin care, incontinence, spasticity, and nutrition should be continued aggressively through the post-operative period, in addition to standard post-operative care. The patient is allowed weight bearing on the operated site after 15 days of complete wound healing. Patient can sit for 15 minutes once or twice a day, then gradually increasing the length and frequency of sitting periods until discharge. Pressure release maneuvers are done at least every 15 minutes while the patient is seated, and the surgical site inspection regularly for signs of recurrence.

CONCLUSION

It is important to note that prevention is the key in managing pressure sores. Regular repositioning, proper wound care, and the use of pressure-relieving devices can help prevent the development of pressure sores in individuals at risk. Along with this, early intervention and a multidisciplinary approach involving healthcare professionals from various specialties are essential for successful pressure sore management and reconstruction.

REFERENCES

1. Guyton, A.C. Capillary fluid exchange, interestitial fluid dynamics and lymph flow. in: A.C. Guyton (Ed.) Human physiology and mechanism of disease. 5th ed. WB Saunders

Company, Philadelphia; 1992: 124–135.

2. Gefen A. Reswick and Rogers pressure-time curve for pressure ulcer risk. Part 1. Nurs Stand. 2009;23:64. 66, 68 [PubMed: 19678520].
3. Gefen A. Reswick and Rogers pressure-time curve for pressure ulcer risk. Part 2. Nurs Stand. 2009;23:40–4. [PubMed:19685678].
4. Callam MJ, Ruckley CV, Harper DR, Dale JJ. Chronic ulceration of the leg: Extent of the problem and provision of care. Br Med J (Clin Res Ed) 1985;290:1855–6. [PMCID: PMC1416814] [PubMed: 3924283].
5. Dodd KT, Gross DR. Three-dimensional tissue deformation in subcutaneous tissues overlying bony prominences may help to explain external load transfer to the interstitium. J Biomech. 1991;24:11–9. [PubMed: 2026630].
6. Kuffler DP. Techniques for wound healing with a focus on pressure ulcers elimination. Open CircVasc J. 2010;3:72– 84.
7. Goossens RH, Snijders CJ, Holscher TG, Heerens WC, Holman AE. Shear stress measured on beds and wheelchairs. Scand J Rehabil Med. 1997;29:131–6. [PubMed: 9271146].
8. Allman RM. Pressure ulcer prevalence, incidence, risk factors, and impact. ClinGeriatr Med. 1997;13:421–36. [PubMed: 9227937].
9. Bliss MR. Hyperaemia. J Tissue Viability. 1998;8:4–13. [PubMed: 10480965].
10. NPUAP. 2007. National Pressure Ulcer Advisory Panel Support Surface Standards Initiative - Terms and Definitions Related to Support Surfaces. Available from: http://www.npuap.org/NPUAP_S3I_TD.pdf.
11. Black J, Baharestani M, Cuddigan J, Dorner B *et al.* (NAPUAP. National Pressure Ulcer Advisory Panel's Updated Pressure Ulcer Staging System. Urologic Nursing 2007; 27:144-150.
12. Norton D. Calculating the risk: reflections on the Norton Scale. Decubitus 1989;2:24–31.
13. Bergstrom N, Braden BJ, Laguzza A, Holman V. The Braden Scale for predicting pressure sore risk.Nurs Res 1987;36:205–210.
14. McInnes E, Jammali-Blasi A, Bell-Syer SE, Dumville JC, Middleton V, Cullum N. Support surfaces for pressure ulcer prevention. Cochrane Database Syst Rev 2015; 9:CD001735.
15. Twersky J, Montgomery T, Sloane R, *et al.* A randomized, controlled study to assess the effect of silk-like textiles and high-absorbency adult incontinence briefs on pressure ulcer prevention. Ostomy Wound Manage 2012;58:18–24.
16. Harris C, Bates-Jensen B, Parslow N, Raizman R, Singh M, Ketchen R. Bates-Jensen wound assessment tool: pictorial guide validation project. J Wound Ostomy Continence Nurs 2010;37:253– 259.
17. van Lis MS, van Asbeck FW, Post MW. Monitoring healing of pressure ulcers: a review of assessment instruments for use in the spinal cord unit. Spinal Cord 2010;48:92–99.
18. Mumcuoglu KY, Lipo M, Ioffe-Uspensky I, Miller J, Galun R. Maggot therapy for gangrene and osteomyelitis. Harefuah. 1997;132:323–5. 382. [PubMed: 9153871].
19. Sherman RA. Maggot versus conservative debridement therapy for the treatment of pressure ulcers. Wound Repair Regen. 2002;10:208–14. [PubMed: 12191002].
20. Schönfeld M, Moll I, Maier K, Jung EG. Keratinocytes from cell culture for therapy of skin defects. Review and personal results. Hautarzt. 1993;44:281–9. [PubMed: 8320114].

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[2] Twetman S, Axelsson S, Dahlgren H, Holm AK, Källestål C, Lagerlöf F, et al. Caries-preventive effect of fluoride toothpaste: A systematic review. Acta Odontol Scand 2003; 61: 347–55.

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[3] Fleischer W, Reimer K. Povidone-iodine antisepsis. State of the art. Dermatology 1997; 195 Suppl 2: 3–9.

Corporate (collective) author

[4] American Academy of Periodontology. Sonic and ultrasonic scalers in periodontics. J Periodontol 2000; 71: 1792–801.

Unpublished article

[5] Garoushi S, Lassila LV, Tezvergil A, Vallittu PK. Static and fatigue compression test for particulate filler composite resin with fiber-reinforced composite substructure. Dent Mater 2006.

Personal author(s)

[6] Hosmer D, Lemeshow S. Applied logistic regression, 2nd edn. New York: Wiley-Interscience; 2000.

Chapter in book

[7] Nauntofte B, Tenovuo J, Lagerlöf F. Secretion and composition of saliva. In: Fejerskov O,

Kidd EAM, editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. pp 7–27.

No author given

[8] World Health Organization. Oral health surveys - basic methods, 4th edn. Geneva: World Health Organization; 1997.

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[9] National Statistics Online—Trends in suicide by method in England and Wales, 1979–2001. www.statistics.gov.uk/downloads/theme_health/HSQ 20.pdf (accessed Jan 24, 2005): 7–18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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