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To cite this article: M H Ohn *et al* 2019 *J. Phys.: Conf. Ser.* **1358** 012018

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Banana peel: is it useful for surgical suturing training?

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Abstract. Banana is a popular world major fruit which contribute around 15% of global fruit generation. It is a standout amongst the utmost generally established tropical fruits, developed more than 130 nations, along the tropics and subtropics of Capricorn. The greater part of the consumable bananas are grown from *Musa acuminata* or *Musa balbisiana*), Pacific tropical bananas (*Musa sapientum*) as well as cooking bananas, also called plantains (*Musa paradisiacal*). Fruit banana isn't just exceptionally nutritious nourishment yet in addition valuable as fragrance, beauty care products and antioxidants for cancer prevention. The paper will feature the convenience of banana peel as a rule and discuss the use of banana peel for surgical training. banana peel is using for practising suturing skills to supplant the costly silicon surgical skin pad. The texture of banana peel is like human skin and more sensible practice. Students were permitted to practice different types of suturing method such as simple interrupted suture, vertical and horizontal mattress suture by using the different species of banana. In conclusion, banana peel is a suitable cheap, eco-friendly and given more reasonable alternative practice for suturing among medical students.

1. Introduction

Banana fills in as a best and low price food for creating nations wherever the greater part of populace depends for the most part on bananas for sustenance. The greater part of the consumable bananas are grown from *Musa acuminata* or *Musa balbisiana*), Pacific tropical bananas (*Musa sapientum*) as well as cooking bananas, also called plantains (*Musa paradisiacal*). Bananas plant parts are valuable as bug spray, antioxidant, shading safeguard, in readiness of different utilitarian nourishments, wine, liquor, biogas, steers feed and so forth [1]. Remarkably, the waste banana peel can be used for different benefits such as removing toxic thorium from contaminated water [2] and production of ethanol by fermentation of waste banana peels [3].

1.1. Chemical composition of Banana Peel

Banana peel is a rich source of starch (3%), crude protein (6-9%), crude fat (3.8-11%) [4], total dietary fibre (43.2-49.7%), and polyunsaturated fatty acids, particular linolenic acid and α -linolenic acid, pectin, essential amino acids (leucine, valine, phenylalanine and threonine), and micronutrients (K, P, Ca, Mg) [5]. Banana peels are also a good source of lignin (6-12%), pectin (10-21%), cellulose (7.6-9.6%),



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hemicelluloses (6.4-9.4%) and galacturonic acid. Pectin extracted from banana peel also contains glucose, galactose, arabinose, rhamnose, and xylose [4]. Micronutrients (Fe and Zn) were found in higher concentration in peels compared to pulps [6].

1.2. Medical Use of Banana Peel

Because of its richness in nutrients and vitamins, banana peel can be used for the whitening of teeth, evacuating warts, curing of Pimples, treating Psoriasis, curing bugs bite, UV protection, skin allergy, sunburn and burn dressing. Fruit banana isn't just exceptionally nutritious nourishment yet in addition valuable as fragrance, beauty care products and antioxidants for cancer prevention. Olden days, indigenous people used banana peels to speed up wound healing. This conventional therapeutic utilization of banana peels and banana leaves is currently being affirmed in present-day evidence-based research.

1.3. Banana Peel in Surgical Suturing Training

The recent paradigm of an underlying, imprecisely organized apprenticed training in surgery is not any more equipped for maintaining a specialist for the span of his career [7], subsequently, different ways are being looked for and created to enhance the traditional surgical skills training. One suggested method is using simulators for suturing training. But the financial cost of surgical training simulators is expensive [8]. Even the cheapest simulation skin pad to practice suturing skills cost about a few hundred dollars to thousand for one piece making medical students from low-income countries to prohibitively purchase for training purpose. To overcome these limitations for surgical education, several educators sought for low-cost alternatives to traditional teaching methods. Prior studies have suggested banana peel as a cheaper and more convenient option for suturing education [9–12]. This paper will discuss the usefulness of banana peel as skin simulator in surgical skills training from the educational aspect.

2. Material and methods

In our observational study, twenty medical students from surgical senior posting were permitted to practice different types of suturing method such as simple interrupted suture, vertical and horizontal mattress suture by using the different species of banana. Ripped and unripped green bananas (*Musa acuminata*) were used for closure of circumcision wound. Surgical instruments (scalpel, forceps, scissors, needle-driver and non-absorbable monofilament 2-0 suture material) were used to assist in suturing. The banana was cut into half and the cut surface was placed on the pad as shown in Figure 1. An incision was done on banana peels and stitches were practised along the incision line for the whole circumference.



Figure 1. Banana peel simulator for suturing education

3. Results

The ripped banana is suitable to practice for the simple interrupted suturing skills and green banana is good for the mattress suture. The texture of banana peel is like human skin and more sensible practice. Students can learn suturing skills by using green and ripped banana in a low-stress condition, at home or hostel by using the demonstration video. Students can practice suturing on a banana peel with the online video-assisted learning. It can be practiced several times up until mastering the skills. It is also easily available to buy in the local market and costs less than a dollar. A limitation is both cannot practice for the sub-cuticular suture. For our finding, it is suggested to use green banana at the beginning followed by a ripped banana. Students can practice not only suturing skills but also practice incision skills and tissue handling skills using the banana. Banana peel is cheap, bio-friendly and given more reasonable practice among medical students.

4. Discussion

Surgical suturing skills is an essential important technical skills training for those entering the surgical era. There is a paradigm shift of medical education from traditional experience-based model to a proficiency based model [13]. Simulation-based training and learning is popular now a days in medical education. The history of simulation training started from the military and the aviation industries since the 1930s [14]. The potential benefit of a simulation-based curriculum for surgical education has been extensively studied and is receiving more acceptance. In the surgical training, there is a development toward affirming competency of the student first with the simulators and then on patients [15]. For the suturing skills training, various types of surgical skin simulators have been introduced, such as expensive artificial skin simulators and making cheaper one using siliconized rubber and a latex foam [8]. Nevertheless, the studies showed there was no difference between low and high fidelity simulators [16].

Bowling points out the price of artificial skin is more expensive compare to animal pig skin, and some centre prefers to use pig skin [17]. Pig foot model is cheaper and chosen for dermatologic suturing skills practice [15]. A drawback of using pig skin is the hypothetical danger of contamination from a needle stick injury or other coincidental ingestion of particulate matter. As pigs are known carriers of zoonoses, for example, brucellosis and leptospirosis and because of the religious issue, in this study we used green and ripped banana peel for suturing training. Green banana is good for practicing mattress suturing and ripped one for simple suturing. The innovative idea of using banana peel as a cost-effective alternative model for suturing education was initiated by [9] which was published in *Annals of Emergency Medicine Journal*.

In 2018, [12] similarly proposed bananas as a low-cost feasible alternative for suturing skill practice. A randomized crossover control trial was conducted for comparing the usefulness of banana peels with simulator foam boards in a resource-limited setting. It was found that banana peel training group was superior to synthetic suture media in terms of suture performance and cost effectiveness. The following simulators are suggested by another study [18]: a green banana is useful for elliptical skin excision, pork belly is useful for skin undermining, pork belly is useful for interrupted and braided suture, ripe tomato is useful for intradermal injection, eggplant for shave biopsy. In our study, the green banana is easy to handle than the ripped one. Both can be used for the suturing practice as long as the students handle tissue gently using round body needles.

5. Conclusion

In conclusion, the impact of this innovation idea is not intended to replace the currently available commercial artificial skin pad products in the market, but to solve the financial constraint of simulation training because of banana peel's nature of the eco-friendliness and cheap price. It is the material safer than the pig skin which can cause communicable diseases like Leptospirosis and Brucellosis. Nowadays, self-directed learning is popular among medical students and it is advised to use this eco-friendly banana peel skin simulation material to practice and master the suturing skills among medical students safely.

6. References

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