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Knowledge About Histology Of Oral Mucosa Among Undergraduates - A Cross Sectional Survey

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ABSTRACT:

BACKGROUND: Oral mucosa consists of epithelium and connective tissue. Based on functions, oral mucosa is classified into masticatory mucosa, lining mucosa and specialized mucosa. Based on the type of epithelium, oral mucosa is divided into keratinized mucosa and non-keratinized mucosa.

AIM: The aim of this study is to assess the knowledge about histology of oral mucosa among undergraduate students.

MATERIALS AND METHODS: This is a questionnaire based cross-sectional study conducted among undergraduates in a private dental college. The survey was conducted among 100 dental students. A self-administered questionnaire of 13 questions was prepared and distributed among dental students through online based survey forms - google forms.

RESULT:Among 100 students, 53.00% were male and 47.00% were female. In our study, 54.55% were aware of the layers of non-keratinised epithelium and 33.33% were unaware of the basement membrane. Also, 51.52% were aware of keratohyalin granules. The association between year of study and response for keratohyalin granules gives a p-value of 0.037. Hence, it is statistically significant.

CONCLUSION: It is concluded that first year students have more knowledge about oral mucosa when compared to second, third and final year students. The undergraduate students should be allowed to process and stain tissue sections of oral mucosa to incorporate interest and comprehension in them.

KEYWORDS: Oral mucosa, keratinised, lamina densa, non-keratinised, novel method

INTRODUCTION:

The oral mucosa is the mucous membrane lining the inside of the mouth. It comprises stratified squamous epithelium, termed "oral epithelium"(1).Oral epithelial cells are connected by various transmembrane proteins with specialized structures and functions (2). The lining of the oral cavity provides protection from the forces of mastication and other potentially noxious effects, characterisation of the architectural tissue changes associated with ageing may help to understand the mechanism leading to these tissue alterations and facilitate their monitoring (3).

Oral mucosa consists of epithelium and connective tissue. Based on functions, oral mucosa is classified into masticatory mucosa, lining mucosa and specialized mucosa(4). Based on the type of epithelium, oral mucosa is divided into keratinized oral mucosa and non-keratinized oral mucosa(5). The layers of keratinized epithelium are basal ,prickel, granular and stratum corneum. The layers of non-keratinized epithelium are basal, intermediate and superficial(6).

Connective tissue is termed as lamina propria which is a finger-like projection. The oral mucosa is attached by a loose connective tissue(7).The loose connective tissue is termed as submucosa. The surface of the oral cavity is a mucous membrane(8).Body cavities communicating with the external surface are lined by mucous membranes that are coated by serous and mucous secretions. It is important for the students to understand the histology to identify the pathology(9–22). Thus,the aim of this study is to assess knowledge about histology of oral mucosa among undergraduate students.

MATERIALS AND METHODS:

This is a questionnaire based cross-sectional study conducted among dental undergraduates in a private dental college. The survey was conducted among 100 dental students. A self-administered questionnaire of 13 questions was prepared and distributed among dental students through online based survey forms - google forms. The responses were collected,tabulated in the excel sheet and analysed using SPSS software version 23. The data were entered in SPSS, and the results were represented in a Bar graph. Chi square test was used to analyse and compare the knowledge about histology of oral mucosa among dental students.

A questionnaire consisting of 10 questions about histology oral mucosa are:

1) Which one do you think are the layers of non-keratinized epithelium?

2) Which layer do you think has Keratohyalin granules?

3) Which of the following do you think laminadensa is made of?\

4) Which one do you think is the width of the basement membrane?

5) Do you know the given picture?

6) Which one do you think are the layers of keratinized epithelium?

7)Do you know the given picture?

8)Do you know the given picture?

9)Do you know the given picture?

RESULTS:

Among 100 students, the majority of the students' responses were from first year(61.62%), pursued by second year(16.16%), third year(13.13%) and final year(9.09%)(Figure 2). In our study, 53.00% were male and 47.00% are female (Figure 3). In our study, 21.21% were aware of the layers of keratinised epithelium (Figure 4). In our study,45.45% were not aware of the layers of non-keratinised(Figure 5).The association between year of study and response for non-keratinised epithelium gives a p-value of 0.037. Hence, it is statistically insignificant (figure 13). In our study, 51.52% were aware of keratohyalin granules (Figure 6). The association between year of study and response for keratohyalin granules gives a p-value of 0.285. Hence, it is statistically insignificant (figure 14). In our study, 47.47%(type IV collagen fibres) were aware of lamina densa (Figure 7). In our study, 33.33% were aware of the basement membrane(Figure 8).The association between year of study and response for basement membrane gives a p-value of 0.155 and majority of the first year students (20.20%) were aware about basement membrane. Hence, it is statistically insignificant (Figure 15). In our study, 21.21% were not aware of keratinisedepithelium(Figure 9). In our study, 11% were not aware of columnar epithelium(Figure 10). In our study, 94.39% were not aware of stratified squamous epithelium(Figure 11). In our study, 89.9% were aware of cuboidal epithelium(Figure 12).

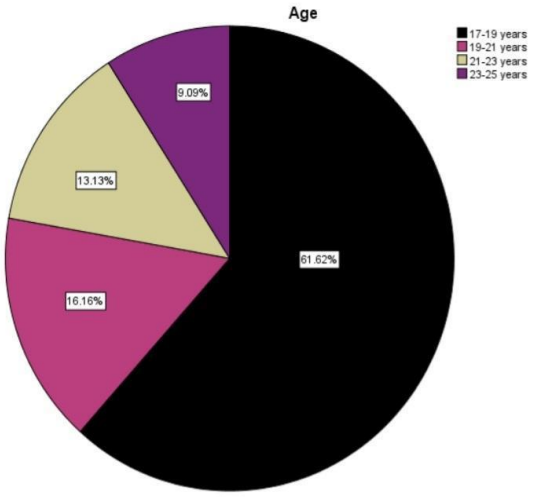

Figure 1: Pie chart shows the percentage of responses for age groups. Black colour indicates age between 17-19, rose colour indicates age between 19-21, yellow colour indicates age between 21-23 and violet colour indicates age between 23-25. Majority of the students were between the ages of 17-19(61.62 %),and others were between the ages of 19-21(16.16%),21-23(13.13%) and 23-25(9.09%).

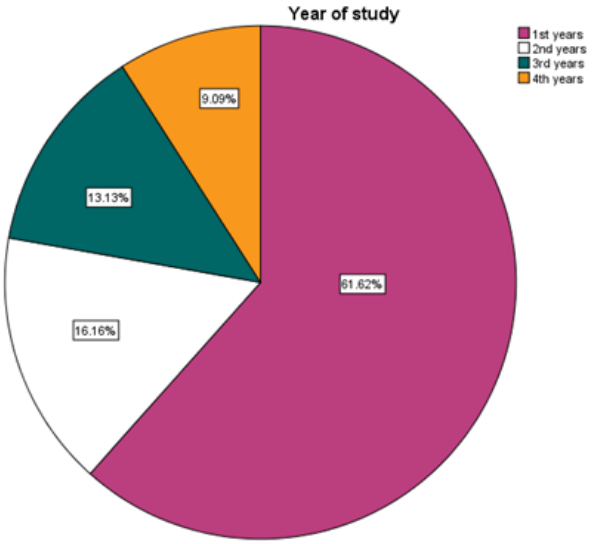

Figure 2: Pie chart represents the percentage of responses for the year of study. Light maroon indicates first year, white indicates second year, dark green indicates third year and orange indicates final year. Majority of them were first year(61.62%) followed by 16.16% were second year, 13.13% were third year and 9.09% were final year.

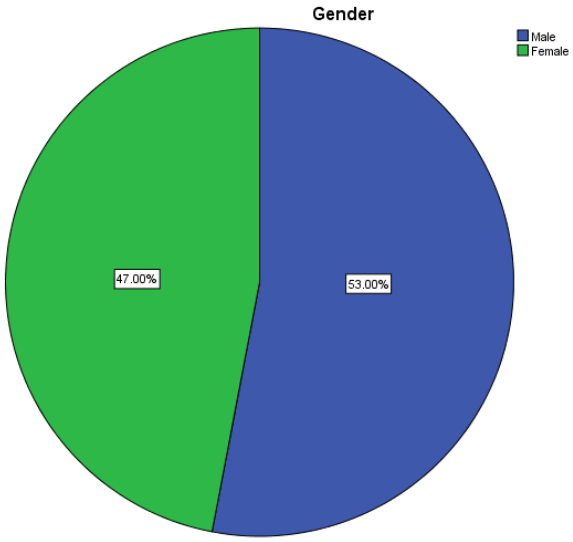

Figure 3: Pie chart represents the percentage of responses for gender. Blue colour indicates male and green colour indicates female. Majority of the population were male(53%) and 47% of the population were female.

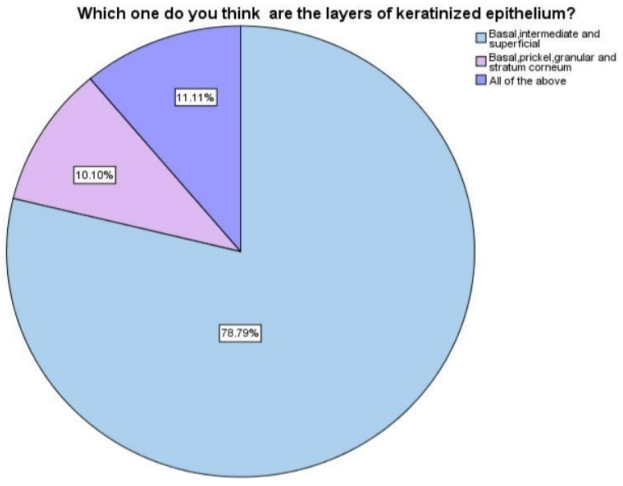

Figure 4: Pie chart represents the percentage of responses for the layers of keratinised epithelium. Blue colour indicates basal, prickle, granular and stratum corneum, lavender colour represents basal, intermediate and superficial and violet colour indicates all of the above. Majority (78.79%)of the

population were aware of the layers of keratinised epithelium whereas 10.10%(basal, intermediate and superficial),11.11%(All of the above) were unaware about the pictorial representation of layers of keratinized epithelium.

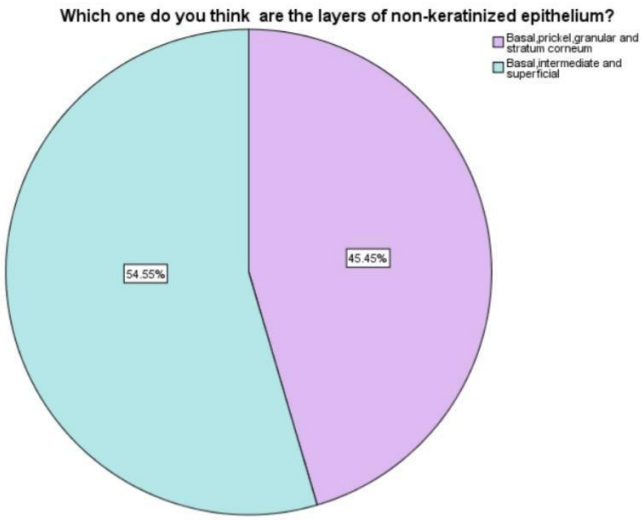

Figure 5: Pie chart represents the percentage of responses for the layers of non-keratinised epithelium. Blue colour indicates basal, prickle, granular and stratum corneum, lavender colour represents basal, intermediate and superficial. Majority (54.55%)of the population were aware of the layers of non-keratinised epithelium whereas 45.45%(basal, prickle, granular and stratum corneum), were unaware about the pictorial representation of layers of keratinized epithelium.

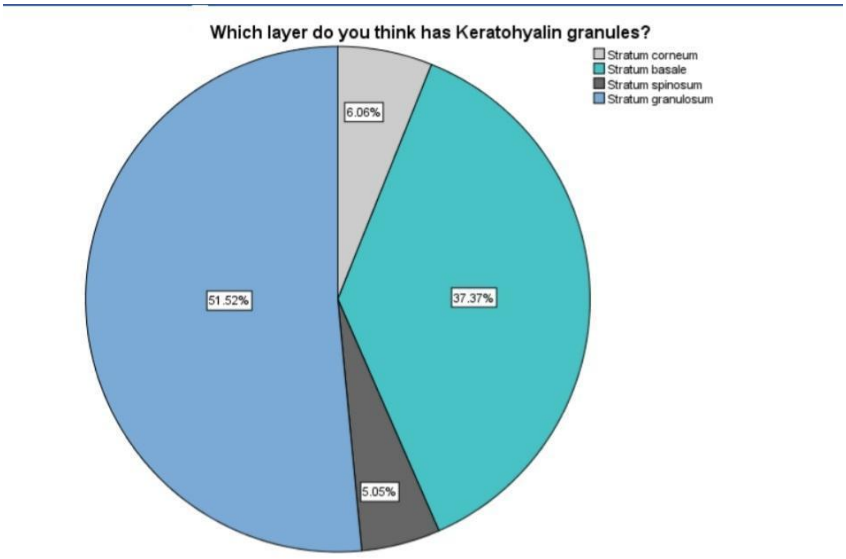

Figure 6: Pie chart represents the percentage of responses for the layer where keratohyalin granules present. Grey indicates stratum corneum,greencolour indicates stratum basale, dark grey colour indicates stratum spinosum and blue colour indicates stratum granulosum. Majority (51.52%)of the population were aware whereas 37.37%(stratum basale),6.06%(stratum corneum), 5.05%(stratum spinosum) were unaware about the pictorial representation of keratohyalin granules.

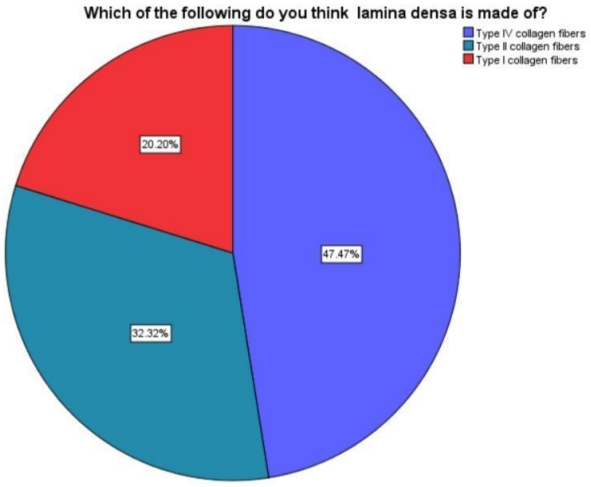

Figure 7: Pie chart represents the percentage of responses for collagen in Lamina Dura. Blue colour indicates the type IV collagen fibres, green colour represents type II and collagen fibres, red colour represents type I collagen fibre. Majority 32.32% (type II collagen fibre), 20.20%(type I collagen fibre)

were unaware that type IV is the collagen fiber present in Lamina Densa whereas 47.47%(type iv collagen fibres) were aware of lamina densa.

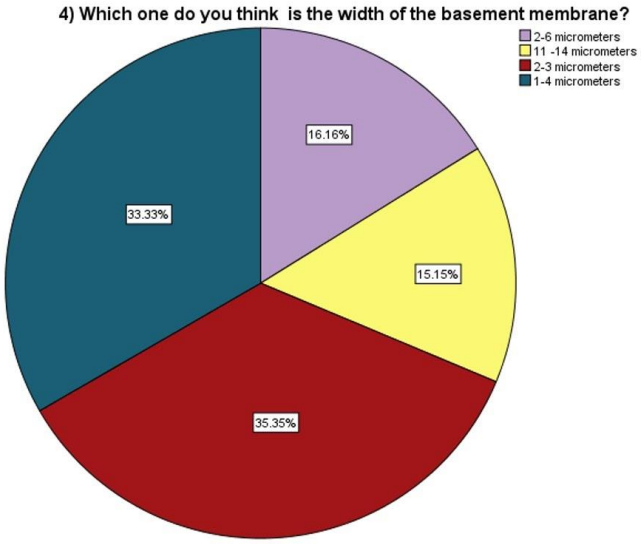

Figure 8: Pie chart represents the percentage of responses for the width of the basement membrane. Violet colour indicates 2-6 micrometers, yellow colour indicates 11-14 micrometers, red indicates 2-3 micrometers and blue colour indicates 1-4 micrometers. Majority 35.35% (2-3 micrometers),16.16% (2-6 micrometers), 15.15% (11-14 micrometers) were unaware about the pictorial representation of basement membrane whereas 33.33%(1-4 micrometers), were aware of the basement membrane.

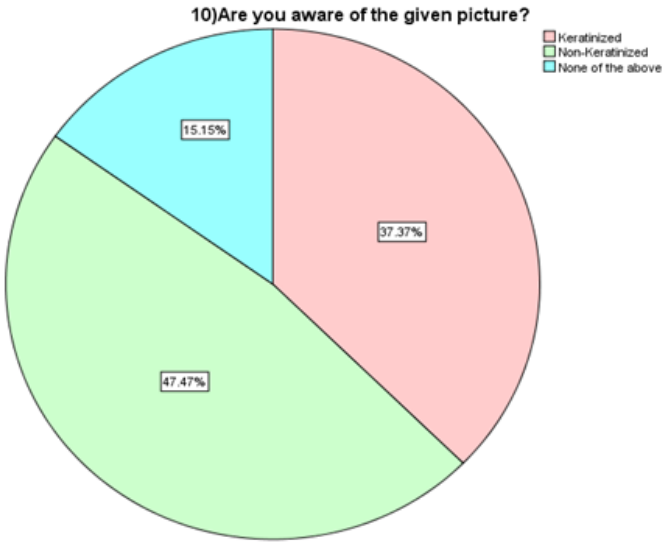

Figure 9: Pie chart represents the percentage of responses for the picture of keratinised epithelium. Pink colour indicates the keratinised epithelium, green colour indicates non-keratinised epithelium and

blue colour indicates none of the above. Only 37.37% of participants were aware whereas 47.47% (Non-keratinised) and 15.15% (None of these) were unaware about the pictorial representation of keratinised epithelium.

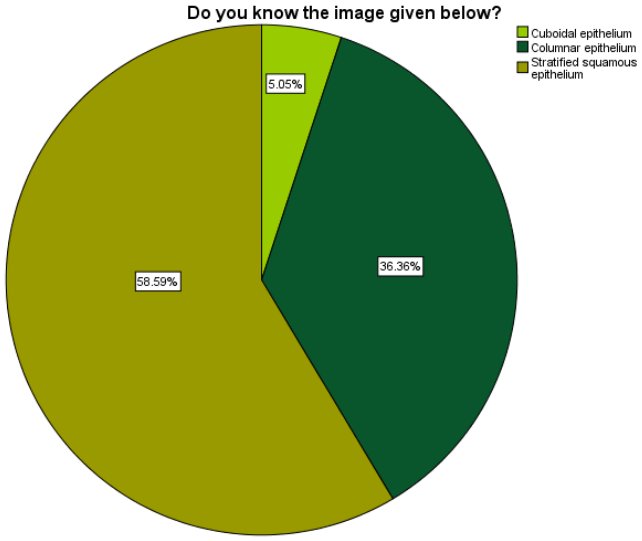

Figure 10: Pie chart represents the percentage of responses for the pictorial representation of columnar epithelium. Green colour indicates stratified squamous epithelium, dark green colour indicates columnar epithelium and light green colour indicates cuboidal epithelium. Majority (63.64%)of the population were unaware of the columnar epithelium and 36.36%(columnar epithelium) were aware about columnar epithelium.

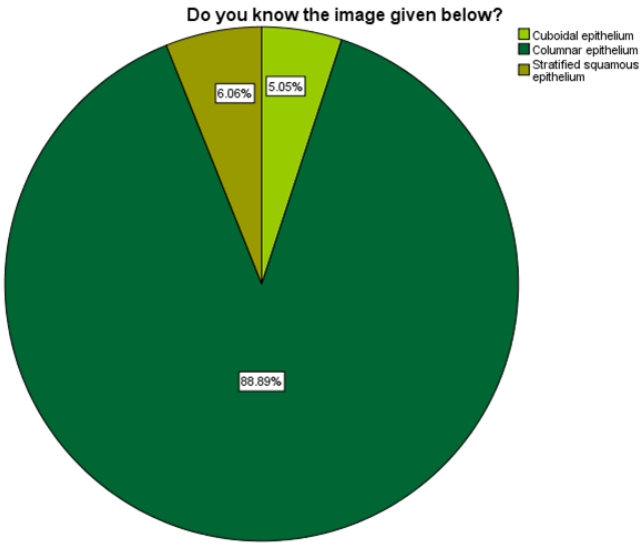

Figure 11: Pie chart represents the percentage of responses for the stratified squamous epithelium. Light green colour indicates the cuboidal epithelium, dark green colour indicates the columnar epithelium and green colour indicates the stratified squamous epithelium. Majority 88.89%(columnar epithelium), 5.05%(cuboidal epithelium) of the population were unaware of stratified squamous epithelium whereas only 6.06%(stratified squamous epithelium) were aware of stratified squamous epithelium.

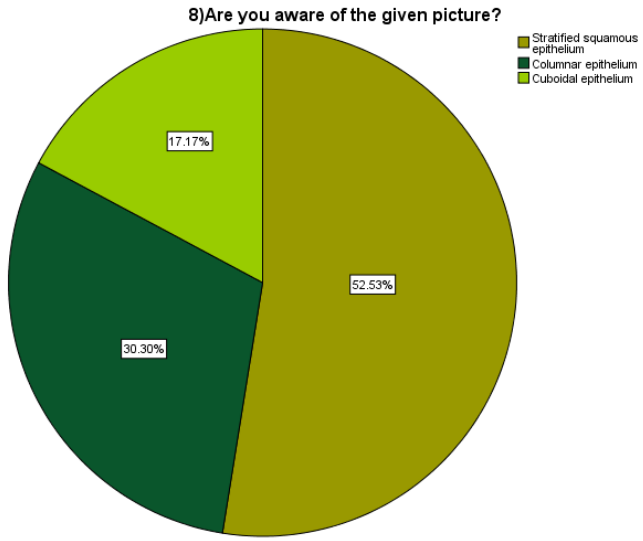

Figure 12: Pie chart represents the percentage of responses for the cuboidal epithelium. Light colour indicates the cuboidal epithelium, green colour indicates the columnar epithelium and yellow colour indicates cuboidal epithelium. Majority 53.52%(stratified squamous epithelium), 30.30%(columnar

epithelium) of the students were unaware of cuboidal epithelium whereas 17.17%(cuboidal epithelium) are aware of cuboidal epithelium. are aware of cuboidal epithelium.

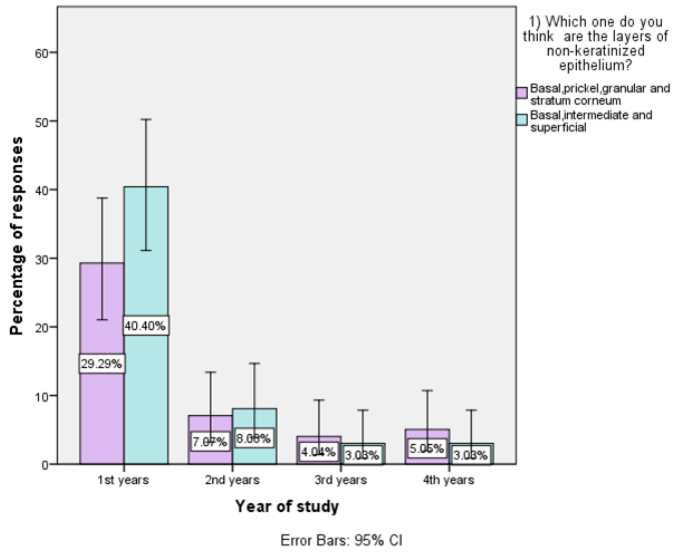

Figure 13: Bar graph represents the association between age and responses for the layers of non-keratinised epithelium. X-axis represents the year of study and y-axis represents the percentage of responses. Majority of the 1st year students (40.40%) were aware about non-keratinized epithelium compared to second year students (8.08%). Pearson chi square test shows p value is 0.285 (p value > 0.05). Hence it is statistically insignificant.

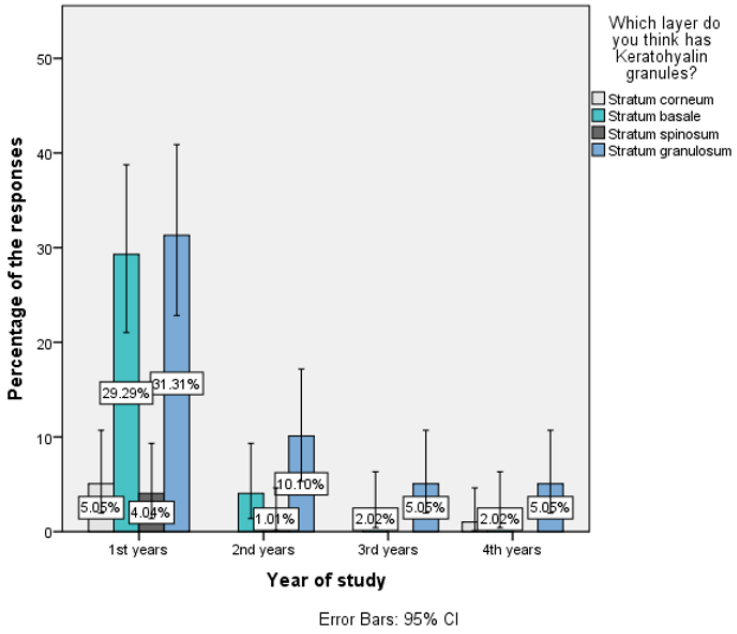

Figure 14: Bar graph represents the association between age and response for the presence of keratohyalin granules. X-axis represents the year of study and y-axis represents the percentage of responses. Majority of the 1st year students (31.31%) were aware that keratohyalin granules are present in stratum granulosum when compared to second year students (10.10%). Pearson chi square test shows p value is 0.037 (p value > 0.05). Hence it is statistically insignificant.

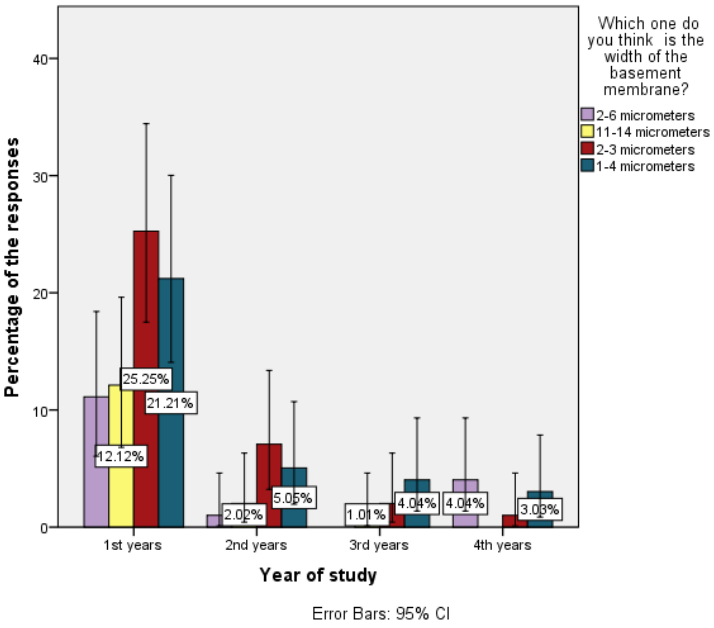

Figure 15: Bar graph represents the association between year of study and response for the width of basement membrane. X-axis represents the year of study and Y-axis represents the percentage of responses. Majority of the first year students (21.21%)were aware about non-keratinized epithelium compared to second year students (5.05%). Pearson chi square test shows p value is 0.155 (p value < 0.05). Hence it is statistically

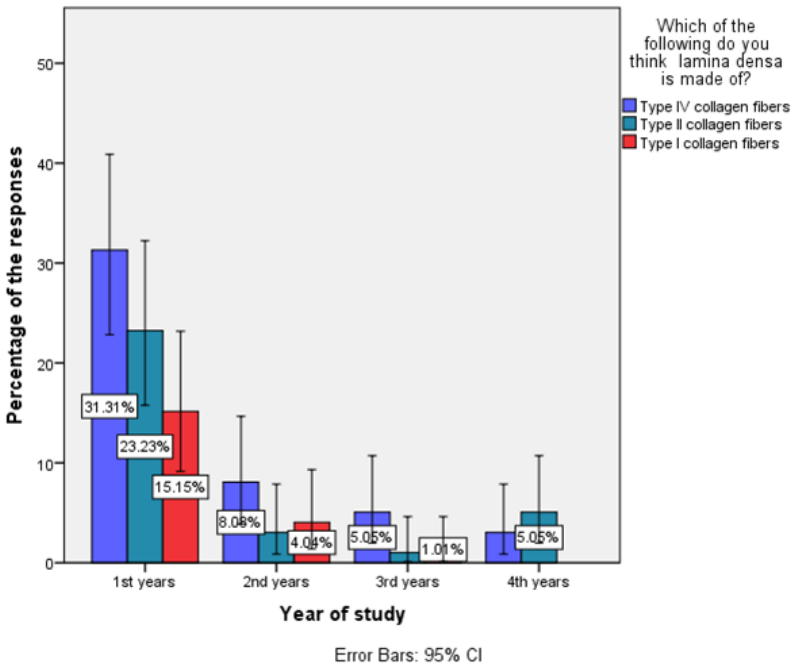

Figure 16: Bar graph represents the association between age and responses for lamina densa. X-axis represents the year of study and y-axis represents the percentage of responses. Majority of the 1st year students (31.31%) were aware about lamina densa compared to third year students (8.08%). Pearson chi square test shows p value is 0.400 (p value > 0.05). Hence it is statistically insignificant.

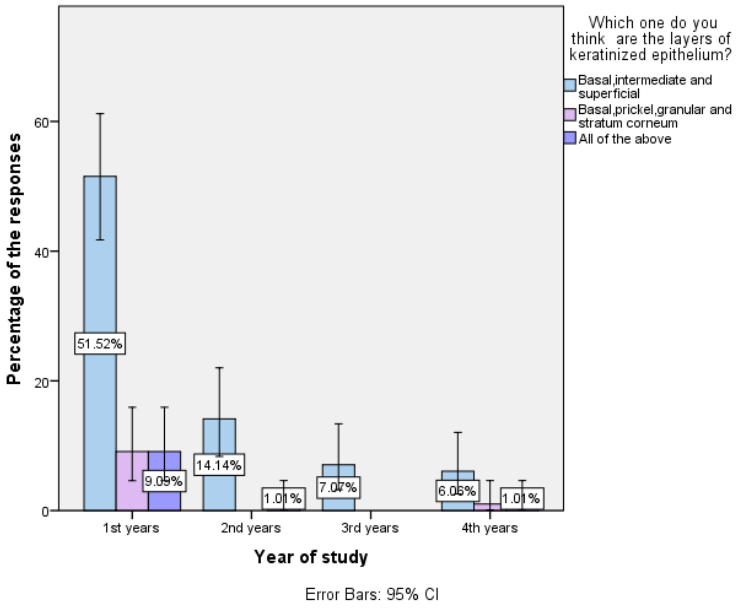

Figure 17: Bar graph represents the association between age and responses for layers of keratinised epithelium. X-axis represents the year of study and y-axis represents the percentage of responses. Majority of the 1st year students (9.09%) were aware about the layers of keratinised epithelium compared to fourth year students (1.01%). Pearson chi square test shows p value is 0.285 (p value > 0.05). Hence it is statistically insignificant.

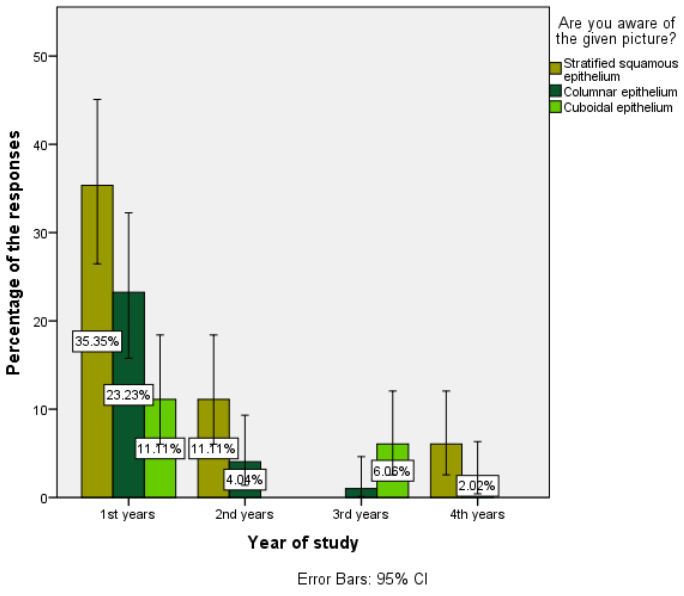

Figure 18: Bar graph represents the association between age and responses for cuboidal epithelium. X-axis represents the year of study and y-axis represents the percentage of responses. Majority of the 1st year students and third year students (11.11%) were aware about cuboidal epithelium when compared to third year (6.06%). Pearson chi square test shows p value is 0.227 (p value > 0.05). Hence it is statistically significant.

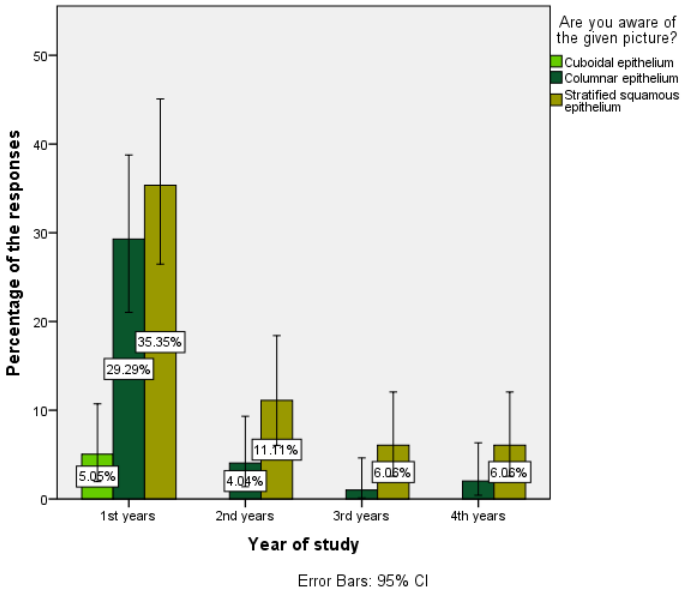

Figure 19: Bar graph represents the association between age and response for the columnar epithelium.X-axis represents the year of study and y-axis represents the percentage of responses. Majority of the 1st year students (29.29%%) were aware of columnar epithelium when compared to third year students (1.01%). Pearson chi square test shows p value is 0.025 (p value > 0.05). Hence it is statistically significant.

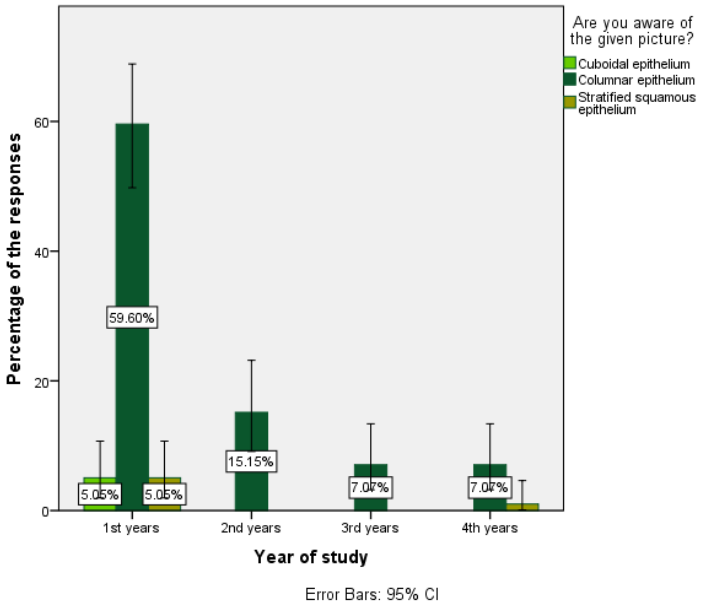

Figure 20: Bar graph represents the association between age and response for the stratified squamous epithelium. X-axis represents the year of study and y-axis represents the percentage of responses. Majority of the 1st year students (5.05%) were aware of stratified squamous epithelium when compared to fourth year students (1.01%). Pearson chi square test shows p value is 0.227 (p value > 0.05). Hence it is statistically insignificant.

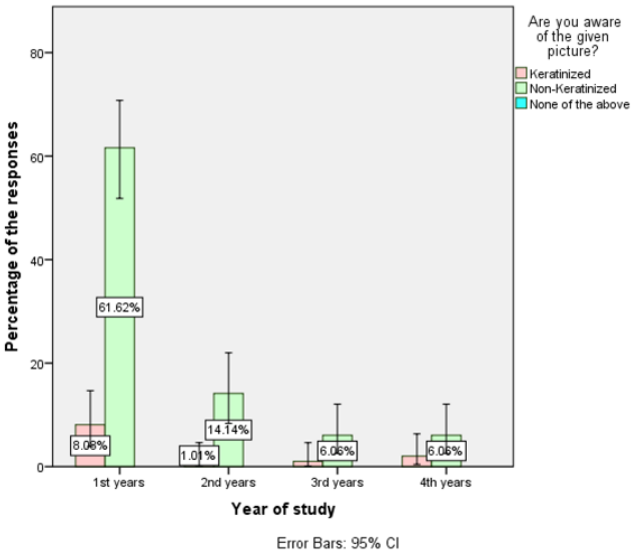

Figure 21: Bar graph represents the association between age and responses for keratinised epithelium. X-axis represents the year of study and y-axis represents the percentage of responses. Majority of the 1st year students (8.08%) were aware about keratinised epithelium compared to third year students (1.01%). Pearson chi square test shows p value is 0.285 (p value > 0.05). Hence it is statistically insignificant.

DISCUSSION:

In our present study,the majority of the students' responses were from first year(61.62%), pursued by second year(16.16%), third year(13.13%) and final year(9.09%). In our study, 53.00% were male and 47.00% were female. Epithelium is broadly classified into keratinised and non-keratinised epithelium. The layers of keratinised epithelium are basal, prickel,granular and stratum corneum(23).In our present study. In the present study, only 10.10% of the population have knowledge about the layers of keratinised epithelium. Keratohyalin granules are present within the stratum granulosum. These granules are insoluble in water and located within the cytoplasm where they promote dehydration of the cell(24). In our present study, 51.52% of the population have knowledge about the keratohyalin granules.The layers of non-keratinised are basal intermediate and superficial. In our present study, 54.55% of the population have knowledge about the layers of non- keratinised epithelium.

The interface between the connective tissue and the epithelium in a light microscope appears thick and it includes the reticular fibers. It is a zone that is 1 to 4 mm wide and is relatively cell free. This zone is called the basement membrane(25). In our present study, 33.33% of the population have knowledge about basement membranes.

A stratified squamous epithelium consists of squamous (flattened) epithelial cells arranged in layers upon a basal membrane. Only one layer is in contact with the basement membrane and the other layers attach to one another to maintain structural integrity(26).In our study, 6.06% were aware of stratified squamous epithelium.

Cuboidal epithelial cells are often found in areas of high metabolic activity, whether the synthesis of secretory products or the exchange of small molecules(27). In our study, 10.10% were aware of cuboidal epithelium epithelium.Stratified squamous epithelium is the common origin of dental, oral mucosal and cutaneous tissues, and there are close associations between disorders affecting these(28). In our present study, 36.36% of the population have knowledge about columnar epithelium.

The lamina densais a component of the basement membrane zone between the epidermis and dermis of the skin, and is an electron-dense zone between the lamina lucida and dermis, synthesized by the basal cells of the epidermis, and composed of type IV collagen(29). In our present study, 47.47% of the population have knowledge about lamina densa. The survey was conducted among only 100 participants and a simple random sampling method was used to select the participants. Hence the same study has to be conducted with more participants. More pictorial representations should be incorporated during lectures. Students can be given hands-on exercises like making models of various types of epithelium to understand the subject in depth.

CONCLUSION:

It is concluded that first year students have more knowledge about oral mucosa when compared to second, third and final year students. The undergraduate students should be allowed to process and stain tissue sections of oral mucosa to incorporate interest and comprehension in them.

ACKNOWLEDGEMENT:

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Self funding.

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