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Knowledge About Histology Of Salivary Glands Among Undergraduate Students - A Cross Sectional Survey

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ABSTRACT :

BACKGROUND : Salivary glands are a group of compound exocrine glands secreting saliva that contains digestive fluids or protein- rich fluids. Salivary glands are predominantly composed of acinar cells and the ductal system. The basic secretory units of salivary glands are called acini.

AIM : The aim of this study is to assess the knowledge about histology of salivary glands among preclinical undergraduates.

MATERIALS AND METHOD : This cross-sectional study is to assess the knowledge about histology of salivary glands among preclinical undergraduates. A questionnaire containing 13 questions were prepared about histology of salivary glands and circulated among first year and second year students of private Dental College through google forms.

RESULTS : In our study, 66.36% of study participants were second year students and 33.64% of them were first year students. Majority (34.58%) of the participants who were aware about the salivary glands were first year students compared to 14.02% of

second year students. Majority (34.58%) of the participants who were aware about the salivary glands were first year students compared to 14.02% of second year students for which pearson chi square test shows p value is 0.002, (p value < 0.05). Hence, it is statistically significant.

CONCLUSION : The knowledge about histology of salivary glands was assessed among preclinical undergraduates. The first year students had better knowledge when compared to second year students about histology of salivary glands.

KEYWORDS : Serous, mucous, duct, acini, saliva

INTRODUCTION :

Salivary glands are a group of compound exocrine glands secreting saliva that contains digestive fluids or protein- rich fluids. Other than components derived from glands, mixed saliva also contains desquamated oral epithelial cells, microorganisms,leukocytes, serum constituents and food remnants. Total volume of saliva secreted per day is 750 to 1000 ml of which submandibular accounts for 60%, parotid about 30% and sublingual about 5% and 1% by minor salivary glands (1).

The salivary glands are two types of salivary glands, major salivary glands and minor salivary glands(1). The three major salivary glands are parotid salivary gland, submandibular salivary gland and sublingual salivary gland secrete saliva which accounts for more than 90% of salivary secretion. The minor salivary glands are located in labial and lingual mucosa, as well as palate and floor of the mouth (2). Major salivary glands can be easily identified on routine imaging but minor salivary glands cannot be identified on routine imaging (3).

The basic secretory units of salivary glands are called acini. Parotid gland consists of serous acini whereas the sublingual gland consists of mucous acini and submandibular salivary gland consists of both serous acini and mucous acini(4). Salivary glands are predominantly composed of acinar cells and the ductal system (striated duct, intercalated duct and excretory duct). The ducts of salivary glands carry the saliva and discharge it into the oral cavity. The initial secretion is received by intercalated duct, then conveyed to striated duct and finally to excretory duct (5). It is necessary for the dental students to know about the salivary glands and thus the aim of this survey is to assess the knowledge about histology of salivary glands among preclinical undergraduates. Our team has extensive knowledge and research experience that has translate into high quality publications (6),(7),(8),(9),(10),(11),(12),(13),(14),(15),(16),(17),(18),(19),(20),(21),(22),(23),(24),(25)

MATERIALS AND METHOD :

This cross-sectional study is to assess the knowledge about histology of salivary glands among preclinical undergraduates. A questionnaire containing 13 questions were prepared about histology of salivary glands and circulated among 107 study participants who were first year and second year students of private Dental College through google forms. The collected responses were entered into microsoft excel and then the output was generated from SPSS software version 23 in the form of pie charts and bar graphs.

The questions included in the questionnaire are as follows;

The questions included for awareness are

Gender

1. Male
2. Female

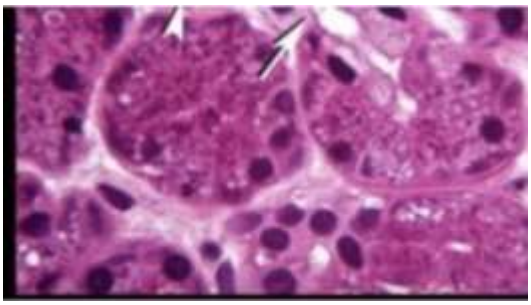
Age

1. 17
2. 18
3. 19
4. 20
5. 21

Year of study

1. 1 year
2. 2 year

Are you aware of the given image?

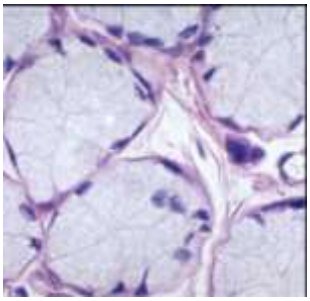


1. Serous acini
2. Mucous acini
3. Both
4. None

Which of the following ducts do you think myoepithelial cells are present in?

1. Striated duct
2. Excretory duct
3. Intercalated duct
4. All of the above

Do you know the given image below?



1. Mixed acini
2. Mucous acini
3. Serous acini
4. Sebaceous acini

Which of the following do you think are present in salivary glands?

1. Acinar cells
2. Ductal cells
3. Myoepithelial cells
4. All of the above

In which of the following do you think zymogen granules are present?

1. Serous acini
2. Mucous acini
3. Myoepithelial cells
4. None

Which of the following do you think are called basket cells?

1. Mucous cells
2. Myoepithelial cells
3. Serous cells
4. All of the above

How many serous acini do you think are present in the secretory terminal unit of serous acini?

1. 6 - 8 serous acini
2. 12 - 14 serous acini
3. 8 - 12 serous acini
4. 4 - 6 serous acini

By which of the following cells forms the lining of an intercalated duct?

1. Tall columnar epithelial cells

2. Pseudostratified columnar epithelial cells
3. Simple cuboidal epithelial cells
4. Simple columnar epithelial cells

Which of the following do you think is the shape of serous cells?

1. Cylindrical
2. Spherical
3. Flat
4. Pyramidal

Which of the following duct do you think has the largest diameter?

1. Intercalated duct
2. Striated duct
3. Both intercalated and striated ducts
4. Excretory duct

RESULTS :

The questionnaire was circulated among preclinical 77 undergraduates in private Dental College and 107 preclinical students have responded to the survey. In our present study 59.81% participants were male and 40.19% participants were female **(figure 1)**. In our study, out of 107 study participants, 13.08% of them were of age 17, 14.95% of them were of age 18, 22.43% of them were of age 19, 38.32% of them were of age 20 and 11.21% of the study participants were of age 21 **(figure 2)**. In our study, 66.36% of the study participants were second year students and 33.64% of them were first year students **(figure 3)**.

In the present study, 48.60% of study participants identified the serous acini image correctly and 51.4% of them could not identify serous acini **(figure 4)**. The present study shows that 69.16% of the study participants have responded correctly that myoepithelial cells are present at the periphery of the intercalated duct **(figure 5).** The study shows that 50.47% of the study participants have identified mucous acini image and 49.54% of them did not identify mucous acini **(figure 6)**. In the present study, 35.51% study participants responded correctly that salivary glands are made up of all acinar cells, ductal cells and myoepithelial cells **(figure 7)**. In the present study, only 15.89% study participants responded correctly that zymogen granules are present in serous acini **(figure 8)**. The study shows that 50.47% of study participants have responded correctly that myoepithelial cells are also called basket cells **(figure9)**. The study shows that 42.99% study participants have responded correctly that the serous terminal unit is made up of 8 - 12 serous acini **(figure 10).** In the present study 41.12% of the study participants responded correctly that intercalated ducts are lined by simple cuboidal epithelial cells **(figure 11)**. In the study 53.27% study participants have responded correctly that the shape of serous cells are pyramidal **(figure 12)**. In the study, 36.45% participants have correctly answered that the excretory duct has the largest diameter **(figure 13)**. In the present study, the association between the year of study of the participants and the percentage of responses about the awareness of salivary glands was assessed. Majority (34.58%)

of the participants who were aware about the salivary glands were first year students compared to 14.02% of second year students. Pearson chi square test shows p value is 0.002, (p value < 0.05). Hence, it is statistically significant **(figure14).** In the study, association between the year of study of students and percentage responses given for the location of myoepithelial cells was assessed. Majority (29.91%) of the study participants who were aware about the myoepithelial cells were first year students when compared to second year students who were 6.54%. Pearson chi square test shows p value is 0.000, (p value < 0.05). Hence it is statistically significant **(figure 15)**. In the study, association between the year of study and responses for the duct with the largest diameter was assessed. Majority (43.93%) of the first years were aware about basket cells compared to second year students (6.54%). Pearson chi-square test was done and p value is 0.000 (p value is <0.05) and hence it is statistically significant **(figure 16)**.

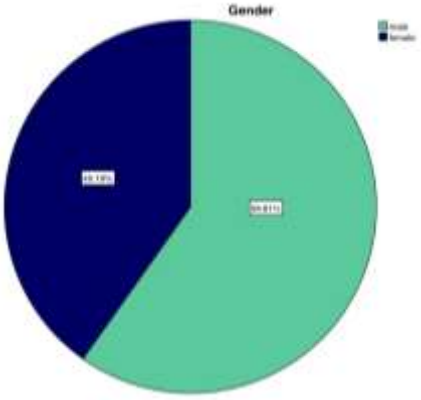


Figure 1 Pie chart represents the number of male and female participants. Greenish blue colour indicates male population and dark blue indicates female population. Majority (59.81%) of the participants were male and 40.19% were female.

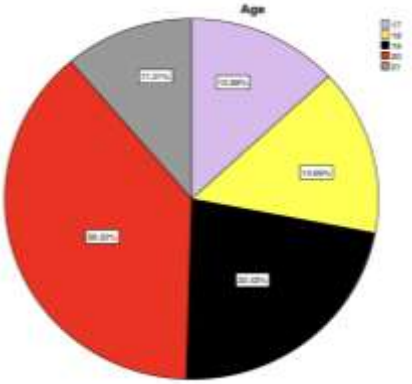


Figure 2: Pie chart represents the age of study participants. Light purple indicates age 17, light yellow indicates age 18, black indicates age 19, red indicates age 20 and light grey indicates age 21. Majority (38.32%) of the participants were of age 20, 13.08% were of age 17, 14.95% were of age 18, 22.43% were of age 19,and 11.21% were of age 21.

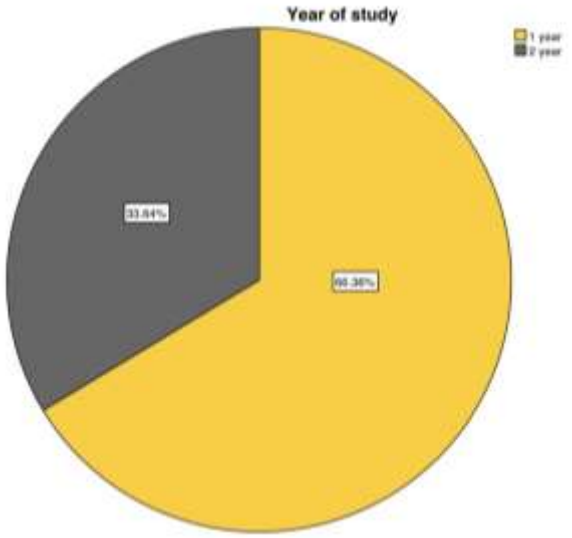


Figure 3: Pie chart represents the year of study of participants. Dark yellow indicates first year students and dark grey indicates second year students. Majority (66.36%) of the study participants were first year students and 33.64% study participants were second year students.

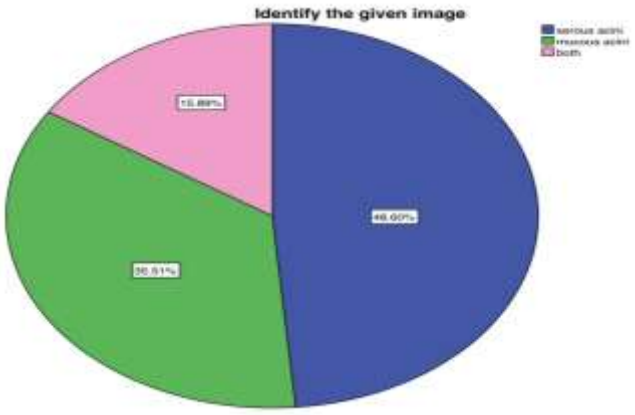


Figure 4: Pie chart represents the pictorial representation of serous acini. Blue represents serous acini, green represents mucous acini and light pink represents both. Majority (48.60%) of the participants were aware about serous acini whereas 35,51% (mucous acini) and 15.89% (both) were unaware about

histology of serous acini.

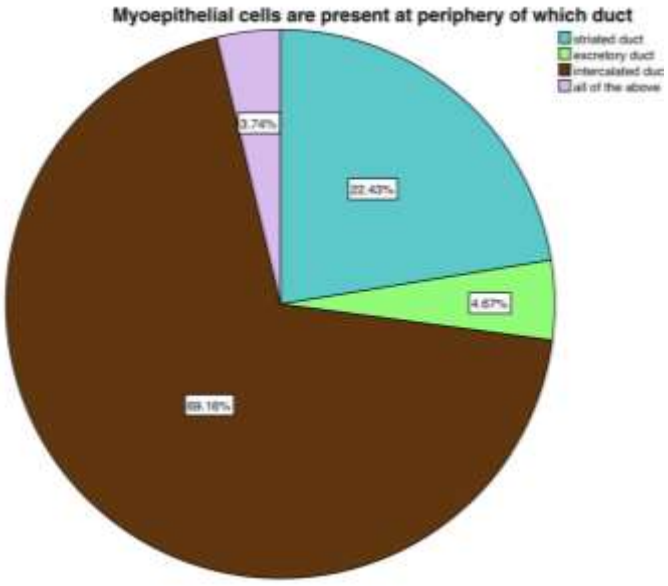


Figure 5: Pie chart represents the response for location of myoepithelial cells. Light blue indicates striated duct, light green represents excretory duct, brown represents intercalated duct and light purple represents all of the above. Majority (69.16%) of the participants were aware about myoepithelial cells, whereas 22.43% (striated duct), 4.67% (excretory duct),and 3.74% (all of the above) were unaware that myoepithelial cells are present at the periphery of intercalated duct.

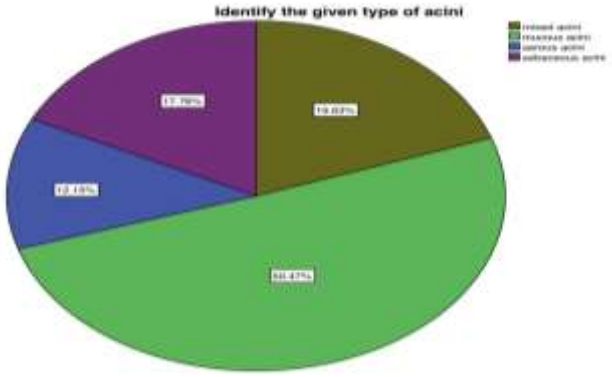


Figure 6: Pie chart represents the pictorial representation of mucous acini. Greenish brown represents mixed acini, green represents mucous acini, blue represents serous acini and violet represents sebaceous acini. Majority (50.47%) were aware whereas 19.63% (mixed acini), 12.15% (serous acini) and 17.76% (sebaceous acini) were unaware about the histology of mucous acini.

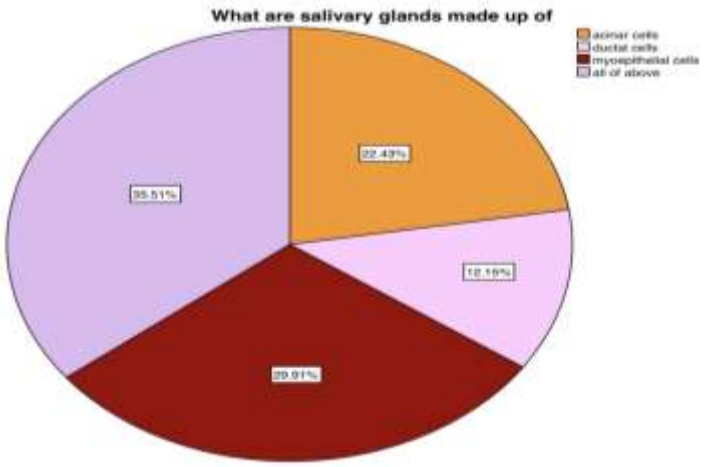


Figure 7: Pie chart represents the response for structure of salivary glands. Orange indicates acinar cells, light pink indicates ductal cells,reddish brown indicates myoepithelial cells and light purple indicates all of the above. Majority (35.51%) of the participants were aware whereas 22.43% (acinar cells), 12.15% (ductal cells), 29.91% (myoepithelial cells) were unaware about the structure of salivary glands.

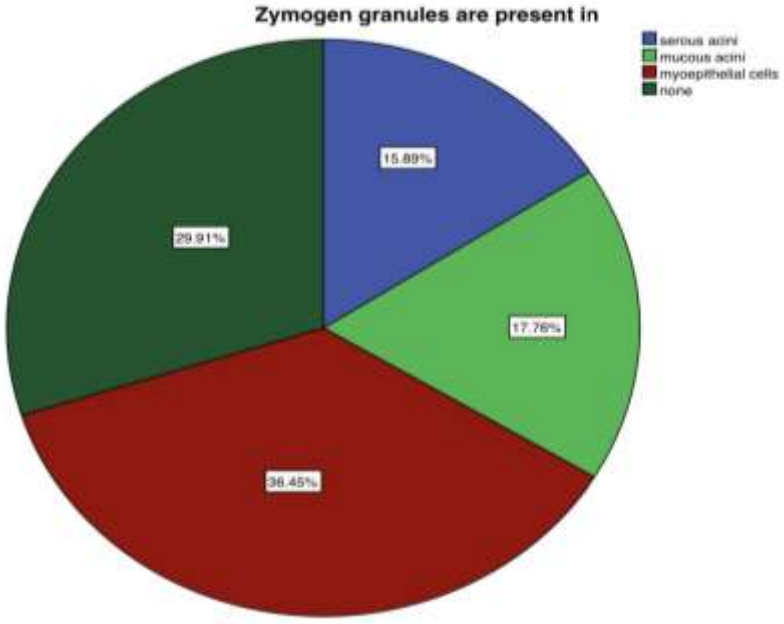


Figure 8: Pie chart represents the responses of questions regarding zymogen granules in acini. Blue represents serous acini, green represents mucous acini,reddish brown represents myoepithelial cells and dark green represents none. Majority of the (36.45%) of the participants were aware whereas 15.89% (serous acini), 17.76% (mucous acini), and 29.91% (none) were unaware that the zymogen granules are present in serous acini.

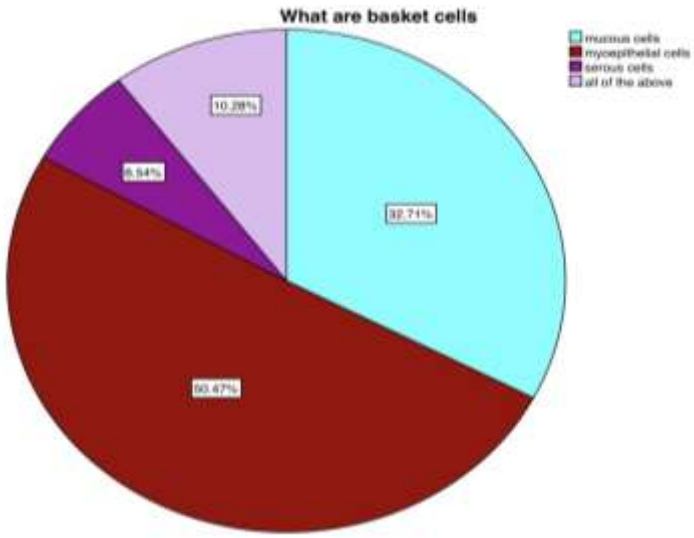


Figure 9: Pie chart represents the responses of questions regarding basket cells. Sky blue indicates mucous cells, reddish brown indicates myoepithelial cells, dark purple represents serous cells and light purple represents all of the above. Majority (50.47%) of the participants were aware whereas 32.71% (mucous cells), 6.54% (serous cells) and 10.28% (all of the above) were unaware that the basket cells are myoepithelial cells.

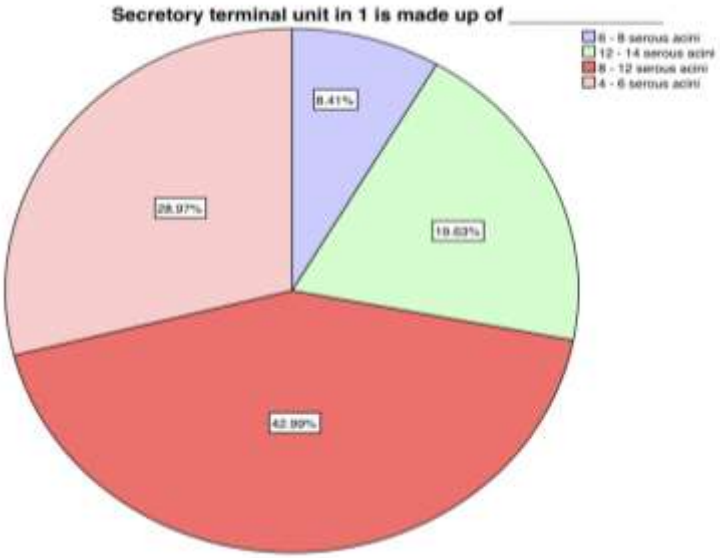


Figure 10: Pie chart represents the responses of questions about the number of serous acini present in the secretory terminal unit. Light purple indicates 6 - 8 serous acini, yellowish green indicates 12 - 14

serous acini, light red indicates 8 - 12 serous acini and light pink indicates 4 - 6 serous acini. Majority (42.99%) of the participants were aware whereas 8.41% (6 - 8 acini), 19.63% (12 - 14 serous acini), and 28.97% (4 - 6 serous acini) were unaware that the secretory terminal unit consists of 6-8 serous acini.

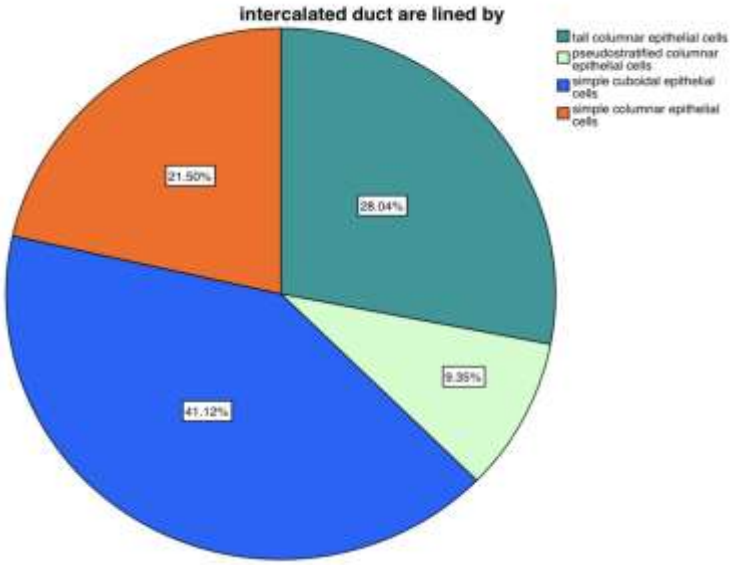


Figure 11 Pie chart represents the responses about who was aware of the lining of the intercalated duct. Dark green indicates tall columnar epithelial cells, greenish blue indicates pseudostratified columnar epithelial cells, sky blue represents simple cuboidal epithelial cells and light orange represents simple columnar epithelial cells. Majority (41.12%) of the participants were aware whereas 28.04% (tall columnar cells), 9.35% (pseudostratified columnar cells), and 21.05% (simple columnar epithelial cells) were unaware that the intercalated duct is made of simple cuboidal epithelial cells.

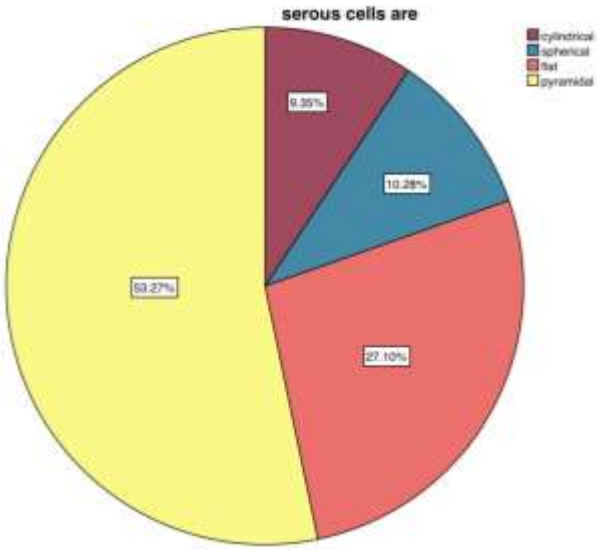


Figure 12: Pie chart represents the responses of those who were aware about the shape of serous cells. Pinkish brown indicates cylindrical, navy blue indicates spherical, peach indicates flat and dark yellow indicates pyramidal. Majority (53.27%) of the participants were aware whereas 9.35% (cylindrical), 10.28% (spherical), 27.10% (flat) were unaware that the shape of the serous cell is pyramidal.

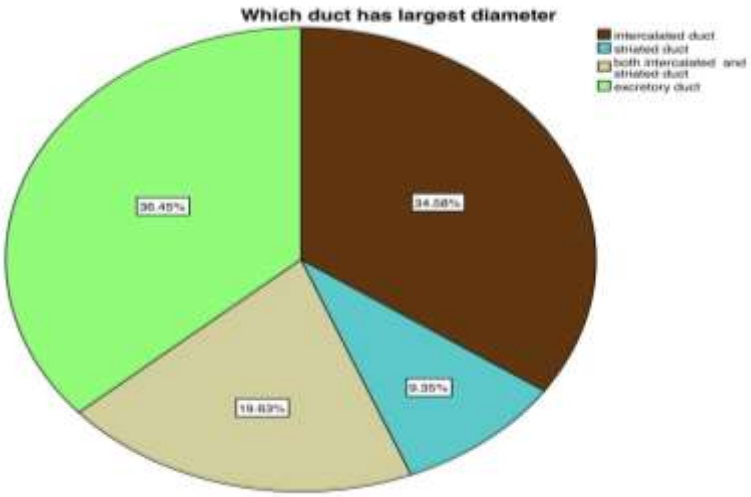


Figure 13 Pie chart represents the responses for the duct with the largest diameter. Brown indicates intercalated duct, light blue represents striated duct, cement colour represents both intercalated and striated duct and light green indicates excretory duct. Majority (36.45%) of the participants were aware whereas 34.58% (intercalated duct), 9.35% (striated duct), 19.63% (intercalated and striated duct) were not aware that the excretory duct has the largest diameter.

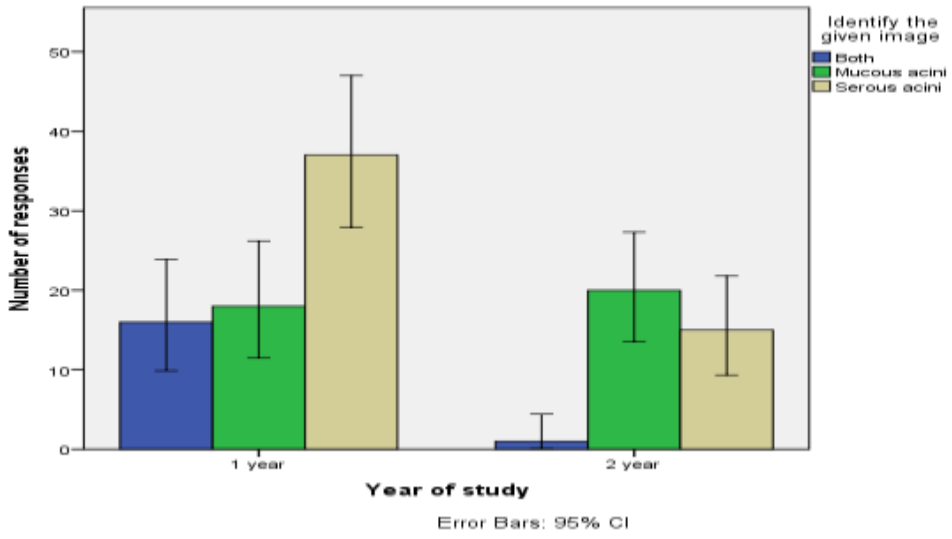


Figure 14 Bar graph represents the association between the year of study of the participants and the percentage of responses for the structure of salivary gland. X axis represents year of study and Y axis represents the percentage of responses given by study participants. Blue represents serous acini, green represents mucous acini and light pink represents both. Majority (34.58%) of the participants who were aware about the salivary glands were first year students compared to 14.02% of second year students. Pearson chi square test shows p value is 0.002, (p value < 0.05). Hence, it is statistically significant.

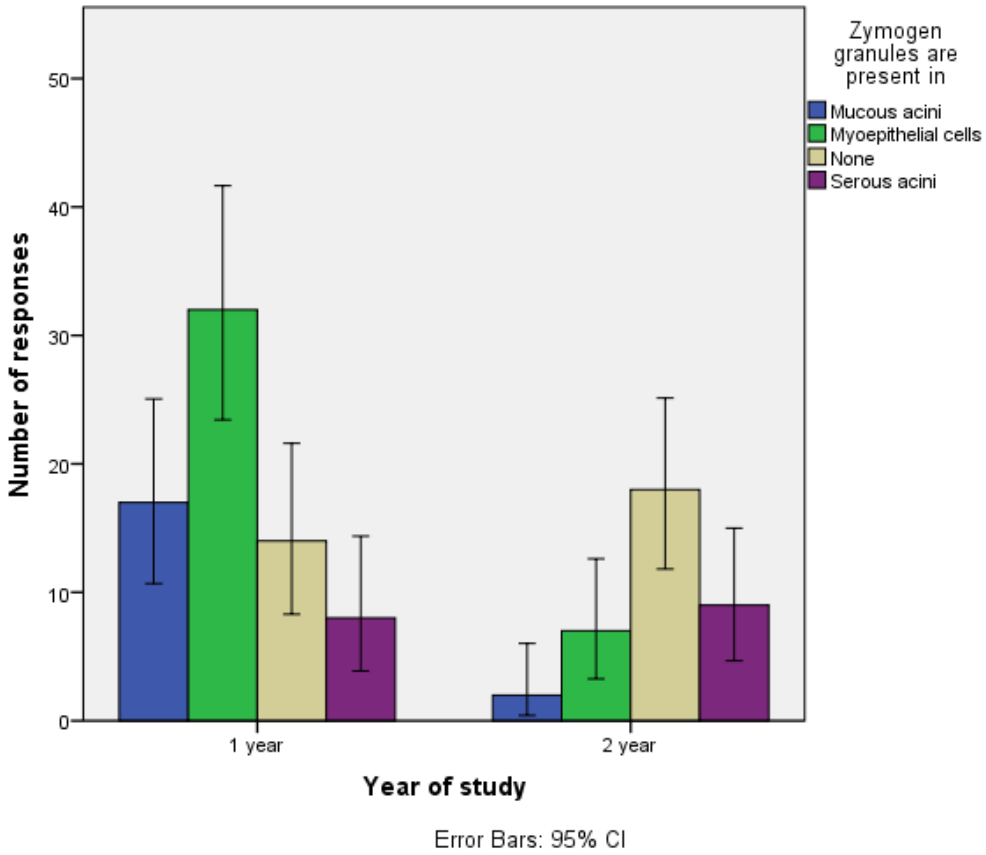


Figure 15 Bar graph represents the association between the year of study of participants and percentage responses given for the location of myoepithelial cells. X axis represents the year of study and Y axis represents the percentage of responses given by study participants. Blue represents serous acini, green represents mucous acini,reddish brown represents myoepithelial cells and dark green represents none. Majority (29.91%) of the study participants who were aware about the myoepithelial cells were first year students when compared to second year students (6.54%). Pearson chi square test shows p value is 0.000, (p value < 0.05). Hence it is statistically significant.

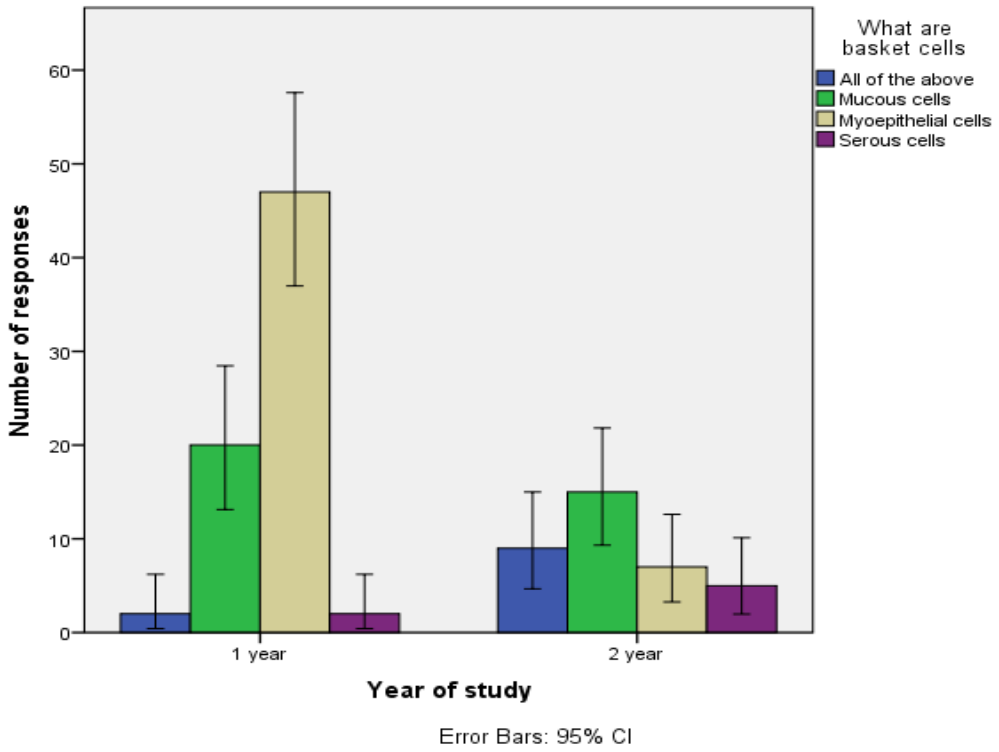


Figure 16 Bar graph represents the association between the year of study and responses for duct with the largest diameter. X axis represents the year of study of study participants and Y axis represents the percentage of responses. Sky blue indicates mucous cells, reddish brown indicates myoepithelial cells, dark purple represents serous cells and light purple represents all of the above. Majority (43.93%) of the first years were aware about basket cells compared to second year students (6.54%). Pearson chi-square test was done and p value is 0.000 (p value is <0.05) and hence it is statistically significant.

DISCUSSION :

In the present study, 48.60% of study participants identified the serous acini image correctly and 51.4% of them could not identify serous acini. The present study shows that 69.16% of the study participants were aware that myoepithelial cells are present at the periphery of the intercalated duct**.** The study shows that 50.47% of the study participants have identified mucous acini image and 49.54% of them did not identify mucous acini. In the present study, 35.51% study participants were aware that salivary glands are made up of all acinar cells, ductal cells and myoepithelial cells. The association between year of study and structure about salivary gland (myoepithelial cells) on pearson chi square test yields a p value of 0.000 and hence it is statistically significant. Majority of the first year students were aware about the histology of salivary glands whereas only a few second year students were aware of histology of salivary glands.

Secretory units of salivary glands are called acini. The terminal secretory unit of a salivary gland is made up of an epithelial secretory unit called acini (26). There are three types of acini, namely serous acini, mucous acini and mixed acini. The cells in the acini rest on a basement membrane. Parotid gland consists of serous acini, sublingual gland consists of mucous acini and submandibular gland consists of both serous

acini and mucous acini(27). In the study, the majority (48.60%) of study participants were aware about serous acini and 50.47% of study participants were aware about mucous acini.

There are three types of ducts, namely intercalated ducts, striated ducts, and excretory ducts. The intercalated duct lumen is continuous with the aciniand is lined by a single layer of cuboidal cells(28). These ducts also secrete lysozymes, lactoferrin, etc(29). Majority (41.12%) of the study participants were aware that the intercalated duct is lined by simple cuboidal epithelial cells. And only 36.45% of study participants were aware that the excretory duct has the largest diameter.

Myoepithelial cells are usually found in glandular epithelium as a thin layer above the basement membrane but generally beneath the luminal cells. Myoepithelial cells are also called stellate cells(30). The myoepithelial cells contain cytokeratin and contractile filaments(31). Majority (50.47%)of the students were aware that myoepithelial cells are also called basket cells and 69.16% of the study participants were aware that myoepithelial cells are present at the periphery of intercalated ducts. Thus the study indicated that first year students have adequate knowledge when compared to second year students. The survey was conducted among only 107 study participants and a simple random sampling was used to select the participants. Hence the study has to be conducted with a larger population. The theoretical aspects can be accompanied with interactive sessions such as pictorial representation or creating salivary gland models for the better understanding of the subject in depth.

CONCLUSION :

The present study thus concluded that first year students have adequate knowledge about histology of salivary glands. Including more slide viewing simultaneously with theoretical classes will add on more knowledge regarding the subject.

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CONFLICTS OF INTEREST:

The authors declare that there are no conflicts of interest in the present study.

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- Saveetha University,
- Christy groups of companies, Thiruchengodu.

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