



Awareness About Role of Genetics in Orthodontics Among Dental Students

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ABSTRACT

BACKGROUND: To develop a report on the level awareness about role of genetics in orthodontics among a small group of dental students in our college through web-based questionnaire. So that this can be utilized for better understanding of students' awareness about role of genetics in the branch of orthodontics

MATERIALS&METHODS: A structured questionnaire test was done to assess the level of awareness about role of genetics in orthodontics through Google form. Ten questions were framed to assess the participants. Three house surgeons conducted the test. All questions were multiple-choice questions.

RESULTS: 25 participants recorded their responses for this survey. All the participants were between age groups of 18-25 years. About 12% participants scored 90%. 60% respondents scored above fifty percentage score. 8% participants scored below 20 % score. Mean score obtained by all participants was 5.6

CONCLUSION: Based on the result of this survey, it is evident that students need be taught in detail about role of genetics in orthodontics starting with foundation that Genetic and environmental factors can play a huge role in the execution of growth mechanisms and result in abnormalities. Hence the students need to be aware how genetics has great role to play in orthodontics.

KEY WORDS: genetics, orthodontics, web-based questionnaire, dental students and genetic factors

INTRODUCTION

Orthodontics like any other discipline in medical science has some of its roots embedded in genetics. The etiological factor genetics has a significant role in development of maxilla, mandible, teeth as well as the occlusion. In the 19th century Frederick G. Kussel after deep studies in this field concluded that skeletal and also the dental malocclusion can be transmitted from one generation to the other^[1]

Many other studies followed this historical conclusion that many dento-facial disturbances namely micrognathia, macrognathia, cleft lip and palate, Downs syndrome, Gardners syndrome, Marfan's syndrome, Cherubism, Osteogenesis imperfecta, Cleido-cranial dysplasia, Mandibulo-facial dystosis, bimaxillary protrusion and atresia, retarded eruption of teeth, abnormal overjet and overbite, open bite, high arched palate, hypodontia and anodontia, abnormal overjet and overbite are of genetic origin.

This study was designed to test the knowledge of dental students whether they are aware of dento-facial disturbances of genetic origin. Questions were framed based regarding the significance of knowledge of dentofacial disturbances which are of genetic influence and its role in orthodontics.

MATERIALS AND METHODS

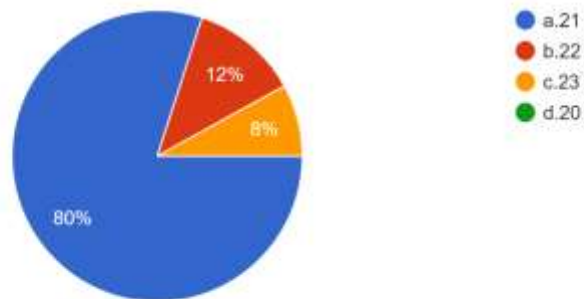
A web-based test using a questionnaire with multiple-choice questions was conducted through Google forms application, among 25 dental students in October 2022. The questionnaire included name, e- mail ids to send feedback and ten questions. The purpose of this study was explained to the participant and the questions were structured to assess the level of knowledge and awareness concerning role of genetics in orthodontics. The Department of orthodontics and dentofacial orthopaedics of THAI MOOGAMBIGAI DENTAL COLLEGE AND HOSPITAL, Chennai approved this study.

STATISTICAL ANALYSIS

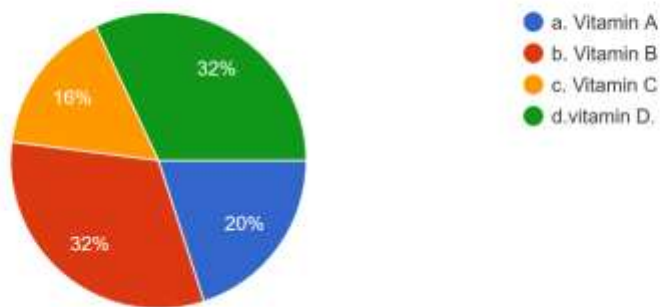
Microsoft Excel 2007 was used to generate statistics for this study

THE QUESTIONNAIRE**1. Which chromosome is involved in downs syndrome?**

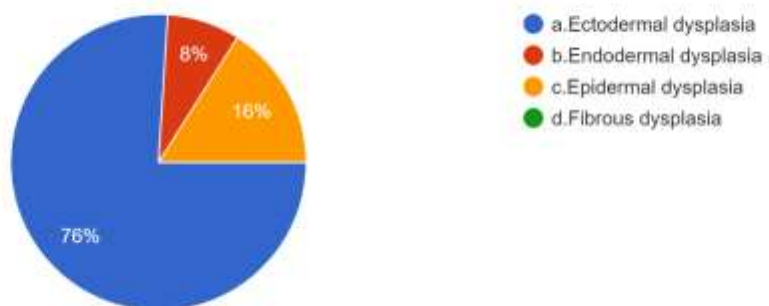
25 responses

**2. What deficiency causes cleft palate?**

25 responses

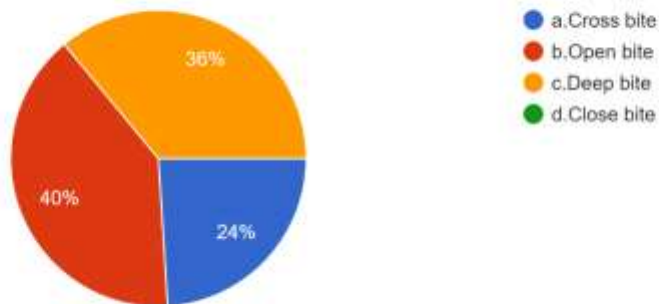
**3. What is the genetic causes of anodontia?**

25 responses



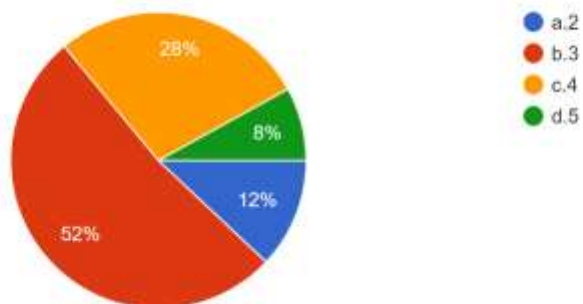
4.what is the most common dentofacial deformities caused by genetics?

25 responses



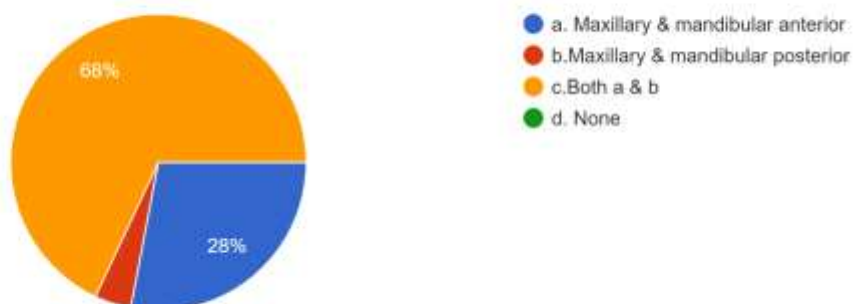
5.How many laws are there in mendelian mode of inheritance?

25 responses



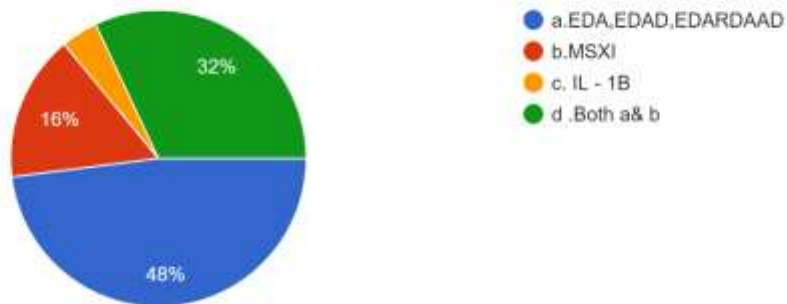
6. Open bite is formed between -----

25 responses



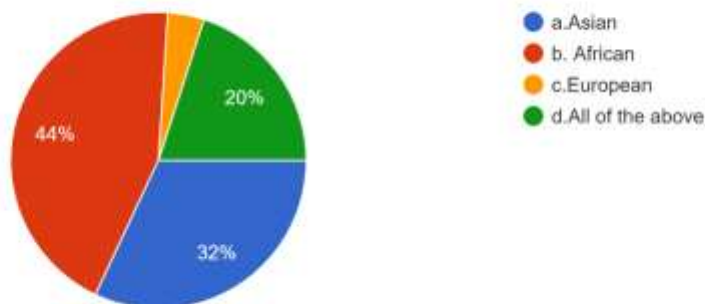
7. Genes involved in anodontia are-----

25 responses



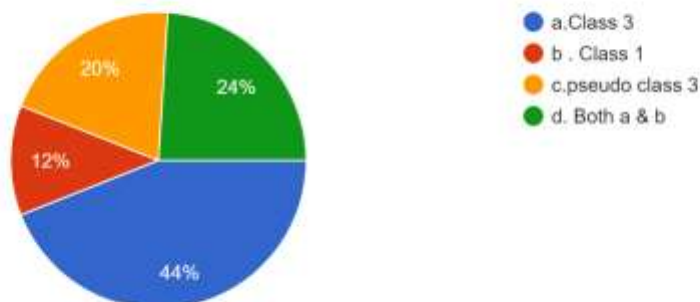
8. Bimaxillary protrusion are most commonly seen in what type of population?

25 responses



9. Which of the following malocclusion has polygenic mode of inheritance?

25 responses



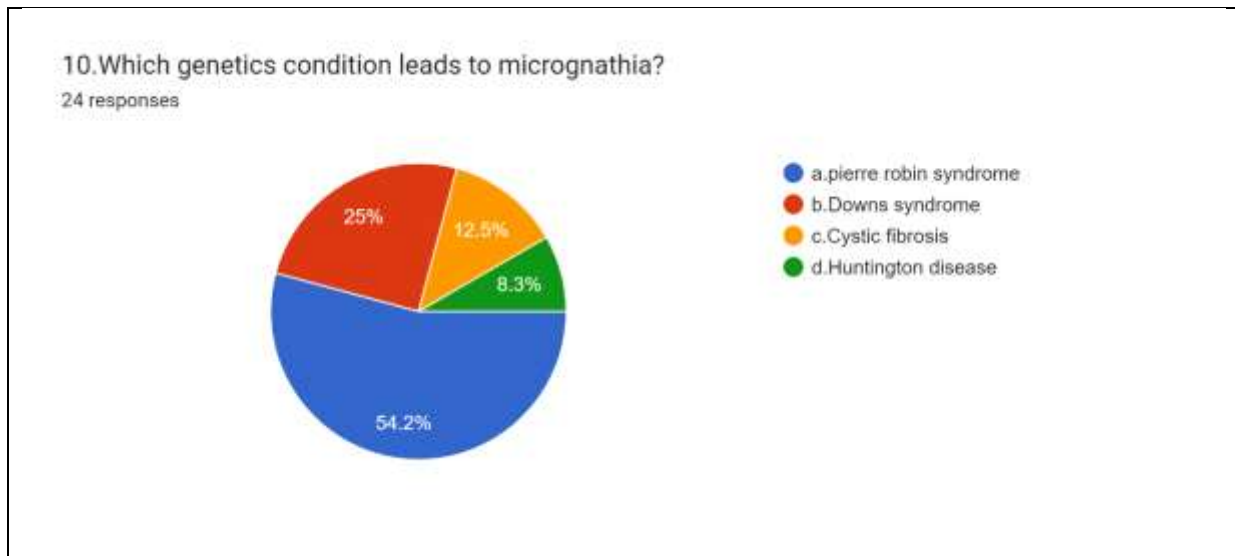


TABLE 1 : QUESTIONS AND RESPONSES

RESULTS

The results from the present study provides information about the awareness of dental students about role of genetics in orthodontics. 25 dental students took up this test. 24 participants responded to all questions while of them missing out the 10th question.

Question wise analysis

1. Which chromosome is involved in downs syndrome?

20 of the 25 participants [80%] answered this question correctly, highest correct response among all the questions. The knowledge regarding downs syndrome is quite obvious as it is thought in basic medical sciences during the initial years of the dentistry course.

2. What deficiency causes cleft palate?

Only 32% of the participants got this question correct confusing it between vitamin D which helps in formation of bones, also got 32% of the responses.

3. What is the genetic cause of anodontia?

19 out of 25 participants [76%] answered ectodermal dysplasia, making it one of highest correctly question as obvious anodontia and other developmental disturbances are oriented to dental students as early in the 3rd academic year.

4. What is the most common dentofacial deformities caused by genetics?

There was an easy confusion among the participants quite visible in responding to this question confused between open bite [40%] and deep bite [36%] with later edging out and being the correct answer.

5. How many laws are there in mendelian mode of inheritance?

Being a straight forward knowledge-based question 52% of participants got it right.

6. Open bite is formed between----

The concept of open bite is taught in final year of dentistry in orthodontics, 17 participants answered both maxillary and mandibular anterior and posterior teeth [68%],

While 28% were confused whether its just the anterior maxillary and mandibular teeth.

7. Genes involved in anodontia are

A complicated knowledge-based question to recollect, 48% of the participants got it right.

8. Bimaxillary protrusion are most commonly seen in what type of population?

The participants were confused between Asian and African, as many of them chose African [44%] the incorrect option over Asian [32%], correct one.

9. Which of the following malocclusion has polygenic mode of inheritance?

Class III malocclusion is thought to be a polygenic disorder that results from an interaction between susceptibility genes and environmental factors. 44% of the participants got it right.

10. Which genetics condition leads to micrognathia?

With 24 participants responding to this question, 54% got it right with Pierre – Robin syndrome being the correct answer, knowledge based question as various syndromes associated with dento-facial problems are oriented in 3rd year of dentistry

Discussion

The average score [mean] scored by all participants was 5.24 [SD : 2.27]. None of the participants got a full score of 10 [100%]. Highest being 9/10 scored by 3 participants [12%]. 60% of the participants scored 50% ie 5/10 and above, while 2 participants [8%] scored 20% and below.

64% of the participants scored between 20 to 70%, a major chunk.

The results are summarized in table 2 below.

Score [%]	N=25
90% and above	3[12%]
70-89%	4[16%]
50-69%	8[32%]
20-49%	8[32%]
Below 20%	2[8%]

Table 2: Scores

As the results suggest, more awareness needs to be instilled in minds of dental students about the role of genetics in orthodontics. The average score of five indicates that there is lack of knowledge regarding this topic. The basic foundation of genetics needs to be laid during the initial years of the course. Genetics in orthodontics is included as a small topic in the final year curriculum needs to be expanded and elaborated for better understanding and awareness. Different teaching aids and better guidance will definitely play a great role in doing so.

Conclusion

The knowledge of the role of genetics is essential for dental students which helps to understand why a patient has a particular occlusion, because malocclusion is a manifestation of genetic and environmental interaction on the development of the dentofacial complex. Awareness regarding the genetic expression of the dentofacial abnormalities is an important aid in the correction of malocclusion, as it helps to differentiate the inherited malocclusions from those due to the effect of environmental factors and hence helps to diagnose, treat, and possibly even prevent a malocclusion from occurring in the further generation^[1] The study was quite simple but gave an eye-opener that still awareness needs to be created among dental students about the role of genetics in orthodontics.

REFERENCES

1. Neela PK, Atteeri A, Mamillapalli PK, Sesham VM, Keesara S, Chandra J, Monica U, Mohan V. Genetics of Dentofacial and Orthodontic Abnormalities. *Glob Med Genet*. 2020 Dec;7(4):95-100. doi: 10.1055/s-0040-1722303. Epub 2021 Feb 1. PMID: 33693441; PMCID: PMC7938796.
2. Vieira AR. Orthodontics and Genetics. *Dental Press J Orthod*. 2019 May 20;24(2):92-97. doi: 10.1590/2177-6709.24.2.092-097.sar. PMID: 31116292; PMCID: PMC6526758.
3. Varma, GR Raveendra, et al. "Genetics in an orthodontic perspective." *Journal of Advanced Clinical and Research Insights* 6.3 (2019): 86-90.
4. Carlson, David S. "Evolving concepts of heredity and genetics in orthodontics." *American Journal of Orthodontics and Dentofacial Orthopedics* 148.6 (2015): 922-938.
5. Moreno Uribe L M, Miller S F. Genetics of the dentofacial variation in human malocclusion. *Orthod Craniofac Res*. 2015;18 01:91–99
6. Xue F, Wong R W, Rabie A B. Genes, genetics, and Class III malocclusion. *Orthod Craniofac Res*. 2010;13:69–74.
7. Wolff G, Wienker T F, Sander H. On the genetics of mandibular prognathism: analysis of large European noble families. *J Med Genet*. 1993;30(02):112–116.
8. Hartsfield J K, Jr, Jacob G J, Morford L A. Heredity, genetics and orthodontics: How much has this research really helped? *Semin Orthod*. 2017;23(04):336–347.