

The Determination of Genetics and Medical Genetics Knowledge of Students, Physicians and Academics in A Medical Faculty Model

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Abstract

Objective: Medical Genetics is one of the latest and hot topics in medicine both as a specialty and as the most recent developments after the human genome project. The aim of this study is to determine the basic knowledge about genetics and medical genetics through the faculty of medicine that had no medical genetics department before.

Methods: We assessed the knowledge of medical genetics through a questionnaire that was applied to 549 undergraduate students whom 300 of them were at preclinical and 249 were clinical studies, 149 resident physicians and 86 academic staff in Cukurova University, Adana, Turkey.

Results: The scores of basic knowledge of genetics were ranged from 40% to 100% with an average of 74% according to our data. This significant difference was related to the age and the education level. However, the scores on the knowledge of medical genetics (as a clinical department) were significantly higher in the academic staff (54% positivity) than the resident physicians (39% positivity) and medical students. More interestingly, the lowest rate (9% positivity) was in the students group of 4th, 5th and 6th year of medical studies at clinics, while it was 17% of positivity in the first 3 years of medical education

Conclusion: As a conclusion, while the great importance of medical genetics is well-accepted in all medical literature, there was still a big gap between medical education and the implementation of medical genetics.

Key words: Medical genetic, education, medical students

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Introduction

Medical genetics is one of the most recent developed departments in medical faculties. Over the last decade, after the human genome project data released, there was a transformation in all fields of medicine by an explosion of genetic testing, genetic diseases and genomic data (Zhao and Grant, 2011).

The establishment of medical genetics as a primary specialty and not a subspecialty of another fields in medical training in Europe began most recently, while there were still discrepancies between countries. Genetics is usually thought together with biology as an obligatory lesson during the first year of medical education. Unfortunately, these lessons were thought by non-medical geneticists or by geneticists that has no clinical attitudes. However, there were huge clinical responsibilities of medical genetics that should be given through the medical education. So, the

genetic literacy via the medical education affect the attitudes and understanding of basic genetics/genomics and medical genetics as a clinical specialty.

Medical geneticist has clinical responsibilities of providing patient care in clinical genetics policlinics that include dysmorphology, rare diseases clinics/genomics, prenatal diagnosis clinics, diagnosis laboratory and treatment of rare diseases (Acgme, 2016). Medical geneticists also participate in undergraduate and graduate level courses in human and medical genetics, cytogenetics, biochemical genetics and molecular genetics laboratories.

In this study, the main aim is to focus on the assessment of medical genetics knowledge level in a medical faculty throughout all its components starting from undergraduate students to academic staff and also to find out the importance of medical genetics training thought by appropriate department.

Methods

We measured the participants' genetic and medical genetics knowledge in our study. All of the participants in this study were completed two tests; one for screening the baseline knowledge of genetics and the second for the knowledge about Department of Medical Genetics as a primary clinical specialty.

This study was performed before the integration of medical genetics training program to the undergraduate and graduate education in the Cukurova University Medicine Faculty. There was also no on-going medical genetics clinics at the faculty hospital during the study.

There were three groups for the comparison; (1) undergraduate students (n=549) that was also divided into two groups, one from the first three year (preclinical education) (n=300) and other from clinical period (n=249); (2) resident physicians (n=149) and; (3) academic staff (n=86) at the Balcali Hospital and Clinics of Cukurova University Faculty of Medicine.

We used the well-validated, previously reported 16-item survey to measure the knowledge about basic genetics (Jallinoja and Aro, 1999). Genetics literacy knowledge survey was scored according categorization; 0-40 as inadequate, 41-70 as marginal, or 71-100 as adequate.

To ascertain participants' knowledge about the medical genetics, we have asked 2 survey questions:

1) a- Before this survey, had you ever heard of Department of Medical Genetics?

b- If Yes, where did you know about the Department of Medical Genetics?

2) Have you ever considered to refer any patient to the Department of Medical Genetics?

The answers were classified according to positive perceived knowledge of the Department of Medical Genetics.

Results

Our study demonstrates the characterization of a medical faculty including students, resident physicians and academic staff about the genetics and medical genetics knowledge. We used the descriptive statistics to summarize each study group and the association with knowledge scores.

Overall, 784 participants were enrolled in our study. The 70% of participants (n=549) were undergraduate students, 19% were resident physicians (n=149) and 11% were academic staff (n=86). Undergraduates group were divided into two groups according to the medical education system as 55% of preclinical (n=300) and 45% of clinical period (n=249). The characterization of participants in this study was showed in table 1.

Table 1: The characterization and number of participants in this study.

Characterization of Participants	Number (%)
Undergraduate students	70 (549/784)
Preclinical	55 (300/549)
Clinical	45 (249/549)
Resident physicians	19 (149/784)
Academic staff	11 (86/784)

Genetics Knowledge

The scores of genetic knowledge were ranging from 40% to 100% (mean score=74%) according to our findings. Overall differences in genetic knowledge were observed among the education levels (p=0.0001) with the highest score in academic staff and lowest in preclinical undergraduate students. However, no differences were noted between these groups on questions pertaining to the inheritance-related questions (mean score 90.6%). But, when we compared to the scores of questions on genes, chromosomes, and cells, there was a statistically significant difference between academic staff and other groups (p=0.0001). None of the participants had under the score of 40 in this study. Only the preclinical period students had a marginal knowledge of genetics (mean=62%).

Medical Genetics Knowledge

Only the 22.6% of the participants (n=177) indicated that they had heard about the Department of Medical Genetics before our survey. The significantly lowest proportion was 9% (n=22) in the group of clinical period students (n=249), followed by the 17% (n=51) in the group of preclinical period students (n=300) (table 2).

The highest rate was in the academic staff group (n=86) as 54% (n=46). Most interestingly, the majority of this group (96.8%) at least once in their career they referred a patient to the medical geneticist (table 2).

The interesting finding is in resident physicians group (n=149) with 39% high positivity (n=58) with only 5% very low rate of referring any patient (table 2).

Table 2: The value of medical genetics knowledge among participants in this study

Participants	Medical Genetics Knowledge (%)
Preclinical Students	17 (n=51)
Clinical Students	9 (n=22)
Resident physicians	39 (n=149)
Academic staff	54 (n=46)

Discussion

Medical genetics or clinical genetics in some countries has been recognized as an EU (European Union) – wide primary medical specialty since March 3rd, 2011 by the Commission adopted Regulation (EU) No:213/2011 amending Annexes II and V to Directive 2005/36/EC of the European Parliament and of the Council on the recognition of professional qualifications. Since then, education of medical genetics towards successful implementation in the medical training becomes more important. There were studies that underlie the importance of genomic knowledge and its effect in public debates on genomic issues including genetic concepts of prenatal diagnosis; newborn screening and genetics research (Catz et al 2005; McInerney 2002; Lea et al 2011; Levitt et al 2005). Although given recent and prevalent scientists attention to medical genetics and their role in scientific explanation, the studies about medical genetics has still been understudied.

Thus, in our study we studied the status of a well-known university with a medical faculty without an established Department of Medical Genetics throughout the knowledge level in genetics and medical genetics.

In summary, in this article we demonstrated the genetic knowledge to the association of medical genetics department and an actual comprehension

of all over a medical faculty from students to academic stuff.

The scientists have already theorized and practices debated about the medical genetics of natural development for decades and medical genetics is quite common for all of scientists to refer to the other medical branches in all the world (Brown 2016; Matthews 2016).

There are new studies about provide a useful evolutionary lesson about the impact of selection on spatial patterns of medical genetic variation, when the environment affects which individuals can colonize new sites, and on adaptive genetic variation, when environmental heterogeneity creates divergence at specific loci underlying local adaptation. After these studies the new branches were development about medical genetics like immunogenetics, epigenetics (Sork et al., 2016; Davies et al., 2016). In addition the results of studies suggest that associations identified between genetic and other medical branches like dermatology, oncology and microbiology (Eroglu et al., 2014; Li X et al., 2016; Suh et al., 2016).

Overall, while there was a high knowledge of genetics, the medical genetics knowledge differs from that. Most of our data indicates that the higher knowledge levels related to the higher education. However, there was a negative correlation in terms of medical genetics knowledge; 17% positivity in preclinical and 9% positivity in clinical students. Interestingly, the 85% of preclinical students with positive knowledge obtained their knowledge during the very first few months of the medical school via the internet searches about postgraduate specialties but not by courses during the education.

Providing clinically meaningful education and training in genomics is central to enabling every health employee to develop the appropriate knowledge and skills in genomics in order to provide optimum care to individuals and families now, and to facilitate the integration of new information and technology as it becomes available across mainstream healthcare services (Tonkin et al., 2011). Our study by its concept, points out the importance of re-defining the medical education by the novel concepts in medicine such as medical/clinical genetics, and the imbalance of knowledge between medical education and scientific concepts.

Informed Consent: Written informed consent was obtained from students who participated in this study.

Ethics Committee Approval: The approval was obtained from the local Ethical committee

Peer-review: Externally peer-reviewed.

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Conflict of Interest: No conflict of interest was declared by the authors.

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