DOI: https://doi.org/10.54393/pjhs.v5i04.1587

PAKISTAN JOURNAL OF HEALTH SCIENCES
https://thejas.com.pk/index.php/pjhs
ISSN (P): 2790-9352, (E): 2790-9344
Volume 5, Issue 4 (April 2024)

Original Article

Exploring Association of Level of Empathy with Demographic Factors among Medical and Dental Students, A Comparative Cross-Sectional Study

Fatima Aslam[1], Sana Noor[2*], Aafia Malik[3], Rameen[1], Gohar Javed[4], Hafsah Nasir[4], Anusha Nauroz Ali[4] and Mahnoor Sumaiya Nadeem[4]

[1]Department of Medical education, University of Health Sciences, Lahore, Pakistan
[2]Department of Community Medicine, Avicenna Medical and Dental College and Hospital, Lahore, Pakistan
[3]Department of Psychiatry, Herefordshire and Worcestershire Health and Care Trust, United Kingdom
[4]Avicenna Medical and Dental College and Hospital, Lahore, Pakistan

ARTICLE INFO

Keywords:
Empathy, Demographic Factors, Patient Care, Medical Students

How to Cite:
Aslam, F., Noor, S., Malik, A., Rameen, ., Javed, G., Nasir, H., Ali, A. N., & Nadeem, M. S. (2024). Exploring Association of Level of Empathy with Demographic Factors among Medical and Dental Students, A Comparative Cross-Sectional Study: Level of Empathy among Medical and Dental Students. Pakistan Journal of Health Sciences, 5(04). https://doi.org/10.54393/pjhs.v5i04.1587

***Corresponding Author:**
Sana Noor
Department of Community Medicine, Avicenna Medical and Dental College and Hospital, Lahore, Pakistan
dr.sanajamal@gmail.com

Received Date: 18th March, 2024
Acceptance Date: 22nd April, 2024
Published Date: 30th April, 2024

ABSTRACT

Being an effective physician, one must possess both clinical expertise and a specific range of emotional competencies, including empathy. **Objective:** To determine the empathy scores among medical and dental students and to correlate them with demographic factors like age, gender and academic year. **Methods:** A cross-sectional survey was conducted involving 324 students from medical and dental programs at a private medical and dental college in Lahore. Empathy levels were measured using Jefferson Scale of Physician Empathy- student version (JSPE-S). Data analysis was done using SPSS 24.0. Non-parametric tests were applied to find the significant difference between average scores of JSPE-S and all sub-scales across gender, age, academic year and medical program. **Results:** The mean empathy score on JSPE-S was 66.7. Difference of JSPE-S overall empathy score between age-groups was statistically significant (p-value 0.02). Among the medical and dental students significant difference was found between average scores of perceptive taking and compassionate care. No correlation was found between empathy scores and gender. However, empathy scores were low during initial years of medical school, being the highest in fourth year and then declining again. **Conclusions:** It was concluded that empathy is associated with demographical factors. Among the medical and dental students' significant difference was found between average scores of perceptive taking and compassionate care. Although no difference in empathy scores was found between the two genders however, it declined as students gained more exposure to patients in their senior years.

INTRODUCTION

Empathy within professionalism raises constructive communication between physicians and patients, correlating with enhanced patient satisfaction, increased adherence, and improved clinical outcomes [1]. Establishing a robust doctor-patient bond is vital for delivering top-notch healthcare services, with the empathetic stance of healthcare providers towards their patients playing a crucial role [2]. Empathy, includes cognitive and emotional dimensions, which is pivotal in comprehending and forging deeper connections with patients. Cognitive empathy involves grasping patients, experiences and worries, coupled with effective communication skills, while the emotional aspect hinges on the capacity to share in the other person's feelings [3]. Clinical empathy is when healthcare professionals can grasp a patient's circumstances, viewpoints, and emotions effectively communicate with their understanding ensure it is correct and use that insight to assist the patient in a beneficial manner [4]. However, empathy is not inherent and can be influenced by various factors. Demography has

DOI: https://doi.org/10.54393/pjhs.v5i04.1587

a significant impact on empathy in medical education because of different factors such as age, gender [5, 6] personality traits [7, 8] and academic year [9]. Despite the undeniable significance of empathy, a substantial proportion of healthcare professionals appear to struggle with incorporating empathic communication into their daily practice [10]. Greater number of patients negatively affect the development of empathy among health professionals in the form of burnout. The development of empathetic skills should not be limited to an initial teaching goal but should also be pursued as an enduring aspect of a professional's continuous learning journey [11]. Previous studies have shown that medical school curriculum often prioritizes scientific knowledge and technical skills over the development of empathy among students. This shift towards a scientific approach may lead to a decline in empathy among medical students as they face the challenges of modern medicine [12]. Moreover, the hidden curriculum or organizational culture within medical education institutions may also contribute to fluctuations in empathy scores among students. In a study conducted by Iqbal *et al.*, it was discovered that there is a lack of agreement regarding the fluctuations in empathy levels throughout medical education [2]. Age is an important factor to consider, as individuals typically experience personal and cognitive development as they grow older. Furthermore, gender differences in empathy have been observed in previous studies, with women often displaying higher levels of empathy compared to men. Based on the existing literature, it is clear that empathy plays a crucial role in healthcare and that medical students may experience fluctuations in empathy levels throughout their education. Given the importance of empathy in healthcare, it is crucial to understand how empathy levels may vary among medical students based on factors such as age, gender and academic year.

This study was conducted to assess the empathy scores among medical and dental students and to correlate empathy scores with demographic features like age, gender and academic year.

METHODS

A cross-sectional study was conducted among medical and dental students at a private medical and dental college in Lahore from August to December 2023. This study was approved from Research ethics committee of Avicenna Medical College and Hospital Lahore (IRB-48/01/24/AVC). The Jefferson Scale of Physician Empathy- student version (JSPE-S) was administered to the participants after obtaining approval from the Institutional Review Board and ethical committee. This scale was chosen for its effectiveness in assessing empathy levels among medical and dental students. A purposive, non-probability sampling technique was utilized to select participants from the target population. Only the students from medical and dental programs were included, and they were invited to participate voluntarily. The target population included all students from the medical and dental programs, while students from nursing, physiotherapy, and other allied health sciences were excluded from the study. The total sample size of 324 was calculated using Open Epi Statistical Calculator [13] by taking 5% margin of error at 5%, and 95% CI. A structured questionnaire was used to collect data, which comprised of two sections. One section pertained to the socio-demographics such as age, gender, year of study, and program of study. The second section included the JSPE-S. In 2001, Hojat *et al.*, developed the JSPE-S, specifically tailored for patient care and medical education contexts [7]. This inventory comprises 20 questions evenly divided between positive and negative phrasing. Three sub-scales were identified: "perspective taking" (based on ten positively worded items), "compassionate care" (based on eight negatively worded items), and "standing in the patient's shoes" (based on two negatively worded items). Responses for each item were collected on a 5-point Likert scale ranging from "strongly agree" to "strongly disagree." Total scores range from 20 to 100, with higher scores indicating greater empathy and lower scores indicating lower empathy. Data analysis was done using SPSS 24.0. The p-value < 0.05 was considered as significant. Normality of data was checked and non-parametric tests (Mann Whitney U test and Kruskal Wallis Test) was applied to find the significant difference between average scores of JSPE-S and all sub-scales across gender, academic year and medical program.

RESULTS

The ratio of medical and dental students was 3:1. About 81 (25.0%) of the students participated in the study were enrolled in BDS and remaining 243 (75.0%) in MBBS program. About 30 (9.3%) of the students were in age-group 15-20 years, 231 (71.3%) were 20-25 years and 63 (19.4%) were in 25-30 years age-group. About 75 (23.1%) of the students were in final year, 66 (20.4%) were in fourth year, 52 (16.0%) were in third year, 42 (13.0%) were in second year and 31 (9.6%) were in first year. Remaining 58 (17.9%) of the students were doing house job. The mean empathy score on JSPE-S was 66.7. The average score of perceptive taking was 32.9 compassionate care was 26.3 and average score of standing in patient shoe was 7.5. The empathy score does not follow normal distribution (KS= 0.08, p-value = 0.00). Similarly, perceptive taking, compassionate care and standing in patient shoe do not follow normal distribution (KS= 0.10, p-value= 0.00; KS= 0.10, p-value= 0.00; KS= 0.25, p-value = 0.00). Non-parametric test was applied to test the significant difference between average

DOI: https://doi.org/10.54393/pjhs.v5i04.1587

scores of JSPE-S and all sub-scales across gender, academic year and medical program. Difference of JSPE-S overall empathy score between age-groups was significant at 5% as level of significance (table 1).

Table 1: Average JSPE-S Cores across Age, Gender, Program and Academic Year

Factor	Category	Mean + SD	p-value
Age	15-20 Years	65.23 + 12.53	0.02*
	20-25 Years	67.65 + 8.13	
	25-30 Years	63.73 + 11.89	
Gender	Male	66.14 + 9.46	0.98
	Female	66.85 + 9.60	
Program	MBBS	66.16 + 9.83	0.10
	BDS	68.17 + 8.47	
Academic Year	1st Year	64.16 + 8.58	0.45
	2nd Year	66.60 + 7.10	
	3rd Year	65.15 + 9.39	
	4th Year	67.62 + 9.97	
	5th Year	67.57 + 10.85	
	House Job	67.16 + 9.32	

There was significant difference in average scores of compassionate care among various age-groups. Statistically significant difference exists between average scores of perceptive taking and compassionate care across MBBS and BDS students (table 2).

Table 2: Average JSPE-S Subscale Scores across Age, Gender, Program and Academic Year

Factor	Category	Perceptive Taking		Compassionate Care		Standing in Patient Shoe	
		Mean ± SD	p-value	Mean ± SD	p-value	Mean ± SD	p-value
Age (years)	15-20	32.37 ± 6.98	0.06	25.73 ± 5.20	0.01*	7.13 ± 2.21	0.20
	20-25	33.35 ± 4.52		26.67 ± 3.58		7.64 ± 1.49	
	25-30	31.46 ± 6.20		25.11 ± 4.83		7.16 ± 1.95	
Gender	Male	32.78 ± 5.35	0.76	26.32 ± 4.11	0.79	7.41 ± 1.52	0.17
	Female	32.97 ± 5.07		26.23 ± 4.00		7.56 ± 1.78	
Program	MBBS	32.56 ± 5.35	0.05*	25.99 ± 4.25	0.03*	7.62 ± 1.62	0.07
	BDS	33.88 ± 4.56		27.16 ± 3.29		7.14 ± 1.81	
Academic Year	1st Year	31.23 ± 4.64	0.23	25.26 ± 4.13	0.30	7.68 ± 1.89	0.12
	2nd Year	32.95 ± 3.87		26.62 ± 3.32		7.02 ± 1.62	
	3rd Year	32.31 ± 5.44		25.48 ± 3.70		7.37 ± 1.70	
	4th Year	33.48 ± 5.27		26.68 ± 4.06		7.45 ± 1.75	
	5th Year	33.39 ± 5.80		26.68 ± 4.43		7.51 ± 1.72	
	House Job	32.93 ± 5.10		26.28 ± 4.06		7.90 ± 1.37	

DISCUSSION

Effective communication between patients and healthcare providers plays a crucial role in medical practice. Demonstrating empathy is a key foundation of the patient-provider relationship [14, 15]. This research sought to evaluate empathy levels among MBBS and BDS medical students, as well as their correlation with gender, age, and academic year. In this research, no significant distinction was observed in empathy scores between male and female students. Similarly, Benabbas reported same findings in Iran [16]. Different results were presented by Yeo, indicating higher empathy scores among male participants compared to female students [17]. Conversely, a study conducted in Indonesia revealed higher levels of empathy among female medical students compared to their male counterparts; however, this difference did not reach statistical significance [18]. Nasiri *et al.*, found that female medical students in their final year at Shiraz Medical School, as well as in a study conducted in Kuwait, demonstrated higher levels of empathy using the Persian version of JSPE [19, 20]. The observed gender difference may be attributed to factors such as "perspective-taking" [21] "heightened sensitivity of women in interpersonal relationships," and "their enhanced understanding of patients' emotional cues" [22,23] rather than solely being due to inherent ability differences between genders [24]. Our research found that during the initial three years of medical school, levels of empathy tend to be lower due to limited interaction with patients. Fourth-year students exhibited the highest levels of empathy. However, their empathy began to diminish as they gained more exposure. An investigation conducted in India highlighted a deficit in empathetic attitudes among male first-year medical students specifically [25]. In another research carried out in Kuwait, the study found that 4th-year medical students had the highest levels of empathy, with a minor decrease observed in later years [26]. A qualitative study conducted in the UK revealed that students perceived a tendency to develop desensitized and indifferent attitudes when regularly dealing with terminally ill patients, as a means of safeguarding their own emotional health. In contrast, educators associated ethical decline with heavy workloads, extended working hours, and overall job demands [27]. A multi-center research project carried out at eight medical schools in Pakistan, including both private and government institutions, discovered a decrease in the level of empathy as student advance through their medical education. However, the difference observed was relatively small. Furthermore, there was no discernible contrast between male and female students, aligning with our own research findings [28]. In comparing the overall empathy scores of students in different educational stages (preclinical vs clinical), it was observed that clinical phase students exhibited significantly higher total empathy scores than preclinical phase students. This could be due to senior students' increased exposure to patients, potentially influencing their understanding of the significance of nurturing patient relationships and

DOI: https://doi.org/10.54393/pjhs.v5i04.1587

recognizing empathy as a fundamental element in this context [29]. Research has been carried out in Faisalabad, Pakistan compared the empathy scores of medical students using an integrated modular-based curriculum with formal training in ethics and professionalism to those using a discipline-based curriculum without educational intervention. The study found that the empathy score was higher in the integrated modular group, with potential contributing factors including female predominance in this group as females are often perceived as more caring, kind-hearted, and affectionate [30]. Empathy was observed to decline with age according to our research findings. A longitudinal study carried out involved surveying medical students at the beginning of their course, and then again after 2, 4, and 6 years. The results indicated an increase in empathy levels as the students aged [31]. Meanwhile, a study conducted in Iran indicated a decrease in empathy with advancing age [32]. A scoping review studying the changes in student empathy throughout medical school revealed that four studies utilizing the JSPE-S indicated a decrease in empathy or significantly lower scores on empathy among older students [33, 37]. In our research, it was found that students in the dental program exhibited a greater degree of empathy compared to those in the MBBS program. Conversely, male dental students displayed lower levels of empathy than their counterparts in medical studies [38]. This difference could be attributed to the perception among male applicants for dental training programs that patient care in dentistry is more focused on technical aspects and therefore places less importance on interpersonal skills.

CONCLUSIONS

The empathy is associated with demographical factors to some extent. These factors have a crucial role in empathy building in a person. Although no difference in empathy scores was found between the two genders however, it declined as students gained more exposure to patients in their senior years. Educators need to recognize the significance of being role models. Engaging in thoughtful reflection can enhance the impact of positive role models and counteract the harmful influence of negative role models.

Authors Contribution

Conceptualization: SN
Methodology: FA, GJ, HN, ANA, MSN
Formal analysis: SN
Writing-review and editing: AM, R

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

Source of Funding

The authors received no financial support for the research, authorship and/or publication of this article.

REFERENCES

[1] Paro HB, Silveira PS, Perotta B, Gannam S, Enns SC, Giaxa RR *et al.* Empathy among medical students: is there a relation with quality of life and burnout? PLOS One. 2014 Apr; 9(4): e94133 doi: 10.1371/journal.pone.0094133.

[2] Iqbal MZ, AlBuraikan AR, AlQarni AA, AlQahtani HA, AlOhail AM, AlMusaileem MM. Measuring empathy in medical students: A cross-sectional study. JPMA. The Journal of the Pakistan Medical Association. 2022 Jun; 72(6): 1101-5 doi: 10.47391/JPMA.3226.

[3] Moreto G, Santos IS, Blasco PG, Pessini L, Lotufo PA. Assessing empathy among medical students: A comparative analysis using two different scales in a Brazilian medical school. Educación Médica. 2018 Oct; 19: 162-70. doi: 10.1016/j.edumed.2017.07.019.

[4] Neumann M, Edelhäuser F, Tauschel D, Fischer MR, Wirtz M, Woopen C et al. Empathy decline and its reasons: a systematic review of studies with medical students and residents. Academic Medicine. 2011 Aug; 86(8): 996-1009. doi: 10.1097/ACM.0b013e318221e615.

[5] Stratton TD, Saunders JA, Elam CL. Changes in medical students' emotional intelligence: An exploratory study. Teaching and Learning in Medicine. 2008 Jul; 20(3): 279-84. doi: 10.1080/10401330802199625.

[6] Quince TA, Parker RA, Wood DF, Benson JA. Stability of empathy among undergraduate medical students: a longitudinal study at one UK medical school. BMC Medical Education. 2011 Dec; 11: 1-9. doi: 10.1186/1472-6920-11-90.

[7] Hojat M, Mangione S, Nasca TJ, Cohen MJ, Gonnella JS, Erdmann JB *et al.* The Jefferson Scale of Physician Empathy: development and preliminary psychometric data. Educational and Psychological Measurement. 2001 Apr; 61(2): 349-65. doi: 10.1177/00131640121971158.

[8] Hojat M, Mangione S, Kane GC, Gonnella JS. Relationships between scores of the Jefferson scale of physician empathy (JSPE) and the interpersonal reactivity index (IRI). Medical Teacher. 2005 Nov; 27(7): 625-8. doi: 10.1080/01421590500069744.

[9] Akgün Ö, Akdeniz M, Kavukcu E, Avcı HH. Medical students' empathy level differences by medical year, gender, and specialty interest in Akdeniz University. Journal of Medical Education and Curricular Development. 2020 Jul; 7: 2382120520940658. doi:

DOI: https://doi.org/10.54393/pjhs.v5i04.1587

10.1177/2382120520940658.

[10] Laughey WF, Atkinson J, Craig AM, Douglas L, Brown ME, Scott JL *et al.* Empathy in medical education: its nature and nurture—a qualitative study of the views of students and tutors. Medical Science Educator. 2021 Dec; 31: 1941-50. doi: 10.1007/s40670-021-01430-8.

[11] Moudatsou M, Stavropoulou A, Philalithis A, Koukouli S. The role of empathy in health and social care professionals. Healthcare 2020 Jan; 8(1); 26 doi: 10.3390/healthcare8010026.

[12] Pohontsch NJ, Stark A, Ehrhardt M, Kötter T, Scherer M. Influences on students empathy in medical education: an exploratory interview study with medical students in their third and last year. BMC Medical Education. 2018 Dec; 18: 1-9. doi: 10.1186/s12909-018-1335-7.

[13] Alhaji NB, Babalobi OO, Wungak Y, Ularamu HG. Participatory survey of Rift Valley fever in nomadic pastoral communities of North-central Nigeria: The associated risk pathways and factors. PLOS Neglected Tropical Diseases. 2018 Oct; 12(10): e0006858. doi: 10.1371/journal.pntd.0006858.

[14] Arain FR, Al-Bizrah NA, Alsalmi SA, Al Shalawi AM, Dhafar SO, Aldahasi WA *et al.* Level of patient empathy among medical students of Saudi Medical College: A cross-sectional survey. Middle East J Fam Med. 2019 Dec; 17(12): 4-11. doi: 10.5742/MEWFM.2019.93706.

[15] Nazir M, Alhareky M, Alqahtani A, Alsulaimi L, Alotaibi R, Yousef N *et al.* Measuring empathy among dental students and interns: a cross-sectional study from dammam, saudi Arabia. International Journal of Dentistry. 2021 Apr; 2021. doi: 10.1155/2021/5584423.

[16] Benabbas R. Empathy in Iranian medical students: A comparison by age, gender, academic performance and specialty preferences. Medical Journal of the Islamic Republic of Iran. 2016; 30: 439.

[17] Yeo S. Differences and changes in the empathy of Korean medical students according to gender and vocational aptitude, before and after clerkship. Korean Journal of Medical Education. 2019 Dec; 31(4) : 343. doi: 10.3946/kjme.2019.144.

[18] Wahjudi JW, Findyartini A, Kaligis F. The relationship between empathy and stress: a cross-sectional study among undergraduate medical students. Korean Journal of Medical Education. 2019 Sep; 31(3): 215.doi: 10.3946/kjme.2019.132.

[19] Nasiri M, Amini M, Mani A, Delavari S, Kiani M, Sagheb MM *et al.* Assessing empathy in final-year medical students using the Persian version of the Jefferson Scale of Physician Empathy. Journal of Education and Health Promotion. 2021 Jan; 10(1). doi: 10.4103/jehp.jehp_1539_20.

[20] Hasan S, Al-Sharqawi N, Dashti F, AbdulAziz M, Abdullah A, Shukkur M *et al.* Level of empathy among medical students in Kuwait University, Kuwait. Medical Principles and Practice. 2013 Jun; 22(4): 385-9. doi: 10.1159/000348300.

[21] Shariat SV and Habibi M. Empathy in Iranian medical students: measurement model of the Jefferson scale of empathy. Medical Teacher. 2013 Jan; 35(1): e913-8. doi: 10.3109/0142159X.2012.714881.

[22] Suh DH, Hong JS, Lee DH, Gonnella JS, Hojat M. The Jefferson Scale of Physician Empathy: a preliminary psychometric study and group comparisons in Korean physicians. Medical Teacher. 2012 Jun; 34(6): e464-8. doi: 10.3109/0142159X.2012.668632.

[23] Hassan S, Ibrahim MS, Hassan NG. The Structural Framework, Implementation Strategies and Students' Perception of Team-Based Learning in Undergraduate Medical Education of a Medical School in Malaysia. Education in Medicine Journal. 2018 Mar; 10(1). doi: 10.21315/eimj2018.10.1.7.

[24] Rahimi-Madiseh M, Tavakol M, Dennick RE, Nasiri J. Empathy in Iranian medical students: a preliminary psychometric analysis and differences by gender and year of medical school. Medical Teacher. 2010 Nov; 32(11): e471-8. doi: 10.3109/0142159X.2010.509419.

[25] Ghosh SK, Chakraborty S. Assessment of empathy among first-year medical students: A knowledge, attitude and practice study. Italian Journal of Anatomy and Embryology. 2018 Apr: 1-6.

[26] Khademalhosseini M, Khademalhosseini Z, Mahmoodian F. Comparison of empathy score among medical students in both basic and clinical levels. Journal of Advances in Medical Education & Professionalism. 2014 Apr; 2(2): 88.

[27] Tavakol S, Dennick R, Tavakol M. Medical students' understanding of empathy: a phenomenological study. Medical Education. 2012 Mar; 46(3): 306-16. doi: 10.1111/j.1365-2923.2011.04152.x.

[28] Tariq N, Rasheed T, Tavakol M. A quantitative study of empathy in Pakistani medical students: a multicentered approach. Journal of Primary Care & Community Health. 2017 Oct; 8(4): 294-9. doi: 10.1177/2150131917716233.

[29] El Seifi OS, Alenazi AA, Alfuhaymani AM, Alanazi AA, Alanazi OA, Alanazi LA *et al.* The Level of Empathy Among Medical Students at the University of Tabuk, Saudi Arabia. The Cureus Journal of Medical Science. 2024 Jan; 16(1). doi: 10.7759/cureus.51710.

[30] Ayub A and Khan RA. Measuring empathy of medical students studying different curricula; a causal comparative study. JPMA. The Journal of the

DOI: https://doi.org/10.54393/pjhs.v5i04.1587

Pakistan Medical Association. 2017 Aug; 67(8): 1238-41.

[31] Kötter T, Kiehn L, Obst KU, Voltmer E. The development of empathy and associated factors during medical education: a longitudinal study. Journal of Medical Education and Curricular Development. 2021 Jul; 8: 23821205211030176. doi: 10.1177/23821205211030176.

[32] Rezayat AA, Shahini N, Asl HT, Jarahi L, Behdani F, Shojaei SR *et al.* Empathy score among medical students in Mashhad, Iran: study of the Jefferson scale of physician empathy. Electronic Physician. 2018 Jul; 10(7): 7101. doi: 10.19082/7101.

[33] Ferreira-Valente A, Monteiro JS, Barbosa RM, Salgueira A, Costa P, Costa MJ. Clarifying changes in student empathy throughout medical school: a scoping review. Advances in Health Sciences Education. 2017 Dec; 22(5): 1293-313. doi: 10.1007/s10459-016-9704-7.

[34] Hojat M, Vergare MJ, Maxwell K, Brainard G, Herrine SK, Isenberg GA *et al.* The devil is in the third year: a longitudinal study of erosion of empathy in medical school. Academic Medicine. 2009 Sep; 84(9): 1182-91. doi: 10.1097/ACM.0b013e3181b17e55.

[35] Lim BT, Moriarty H, Huthwaite M, Gray L, Pullon S, Gallagher P. How well do medical students rate and communicate clinical empathy? Medical Teacher. 2013 Feb; 35(2): e946-51. doi: 10.3109/0142159X.2012.715783.

[36] Nunes P, Williams S, Sa B, Stevenson K. A study of empathy decline in students from five health disciplines during their first year of training. International Journal of Medical Education. 2011 Aug; 2: 12-7. doi: 10.5116/ijme.4d47.ddb0.

[37] Youssef FF, Nunes P, Sa B, Williams S. An exploration of changes in cognitive and emotional empathy among medical students in the Caribbean. International Journal of Medical Education. 2014; 5: 185. doi: 10.5116/ijme.5412.e641.

[38] Paloniemi E, Mikkola I, Vatjus R, Jokelainen J, Timonen M, Hagnäs M. Measures of empathy and the capacity for self-reflection in dental and medical students. BMC Medical Education. 2021 Dec; 21: 1-7. doi: 10.1186/s12909-021-02549-3.