Correlation Between Dyspnea, Fear of Falling and Quality of Life in Geriatric Population in Nile Delta Region, Egypt

Badr Al-Amir Hassan[1], Amir Soliman[2], Mohamed Salah El-Sayed[3], Khaled Sayed Ahmed[4], Nadia Mohamed Abdelhakiem[5], Heba A. Bahey El- Deen[6,7], Safy Eldin Mahmoud AboAli[8], Wessam A. Ismail Mohamed[9]

[1] Lecturer of Physical Therapy, Department of Physical Therapy for Internal Medicine, Faculty of Physical Therapy, Delta University for Science and Technology, Egypt.

[2] Professor of Public Health and Community Medicine, Department of Public Health and Community Medicine, Faculty of Medicine, Delta University for Science and Technology, Egypt.

[3] Assistant Lecturer, Faculty of Physical Therapy, Horus University-Egypt (HUE), New Damietta, Egypt.

[4] Lecturer of Physical Therapy for Women's Health, Faculty of Physical Therapy, Horus University, New Damietta, Egypt.

[5] Lecturer of Physical Therapy, Department of Physical Therapy for Neuromuscular Disorders and its Surgery, Faculty of Physical Therapy, Deraya University, ElMinia, Egypt.

[6] Department of Physical Therapy and Health Rehabilitation, College of Applied Medical Sciences, Jouf University, Kingdom of Saudi Arabia.

[7] Department of Physical Therapy for Surgery, Faculty of Physical Therapy, Misr University for Science and Technology, Egypt.

[8] Lecturer of Physical Therapy of Pediatrics Department, Faculty of Physical Therapy, October University for Modern Sciences and Arts (MSA), Egypt.

[9] Lecturer, Department of Physical Therapy for Internal Medicine, Horus University, New Damietta, Egypt.

Abstract:
Objectives: To evaluate the correlation between dyspnea, fear of falling and quality of life in geriatric population.
Methods: A cross-sectional study was conducted to evaluate dyspnea, risk of falling and quality of life in the 183 geriatrics using the Arabic version of Dyspnea-12, fall efficacy scale and short form-36 questionnaires.
Results: This study was conducted in Nile delta region, Egypt with a total of 183 geriatric participants. About 41.3% of them are males, while the rest are females. Their mean age is 68.19, there is a significant correlation between aspects of the dyspnea scale, fall efficacy scale and all aspects of the SF36. There is a negative correlation between aspects of the dyspnea scale and SF 36, higher score on dyspnea scale (indicating poor functionality), is associated with lower score on the SF 36 aspects indicating lower quality of life. There is also a negative correlation between fall efficacy scale and SF 36, higher score on fall efficacy scale (indicating higher fear of falling), is associated with lower score on the SF 36 aspects denoting lower quality of life.
Conclusion: In geriatric population, there is a negative correlation between dyspnea and quality of life, there is also a negative correlation between fear of falling and quality of life
Keywords: Geriatrics, fear of falling, quality of life, dyspnea.

1. INTRODUCTION

Geriatric population undergoes many physiological changes due to complex continuous lifelong unrepaired molecular and cellular damage influenced by internal and external factors like nutrition, exercise, exposure to infection, pollution, radiation, gender, personality, behavior and education. The physiological changes coexist and result in a significant progressive degeneration of the all body systems with aging.

The physiological aging process takes place through three pathways of changes that takes place while aging (1). The first pathway includes alterations in the homeostatic mechanisms of cells, which regulates, circulation and

amount of extracellular fluid; the second pathway is decrease in organ mass; the third and most important pathway of changes, entails a decline in, skeletal muscle, nervous system and endocrinological systems and loss of body's systems functional reserves which lessen the ability to confront with external factors like trauma or surgical procedures (2).

The life span become longer world widely, by 2050, the sixty`s population is expected to grow to two billion individuals, from nine hundred million in 2015. At present, 125 million subjects are eighty years old or more. Keeping up healthy elderly population is the key to the well-being of the elderly individual, as well as, minimizing the charge on medical services and systems (3).

In Egypt, the geriatric population proportion is increasing rapidly, in 1976 sixty years and more was 4.6% of the total population, in 1996 it was 6.65%, in 2006 raised to 6.8%, and within 2015 it raised to 6.8%. In 2021 the proportion was 9.2%, and is expected in 2050 to reach 20.8%, this suggests that, about 20 million Egyptian citizens will be classified as elderly (4).

In 2014, the dyspnea-12 questionnaire Arabic version (D-12-A); was used on a study on Jordanian patients with COPD and revealed significant reliability and excellent construct validity, the study concluded that the D-12-A proves to be a convenient assessment tool for the dyspnea in Arabic speaking patients with COPD (5).

The Falls Efficacy Scale–International (FES-I) modified Arabic version was applied on 100 geriatric patients in Egypt in a study conducted in 2018 and proved to be a valid tool to estimate the risk of falling amid the geriatric population (6).

The SF-36 scale for evaluation of the quality of life at was found to be reliable and valid and assumed to be suitable for Arab communities, especially in North Africa, after being translated and adapted in Tunisia and applied in a study on Tunisian subjects (7). Evaluation of correlation between the results of Dyspnea-12, fall efficacy and short form 36 questionnaires among geriatrics could share in improvement of health and psychological aspects in this sector of population.

AIM OF THE STUDY:

To improve awareness in the field of geriatric physical and psychological health.

Objectives:

To evaluate correlation between aspects of the dyspnea scale (indicating poor functionality), fall efficacy scale (indicating higher fear of falling) and all aspects of SF36 (indicating quality of life).

METHODS:

Technical Design:

A Correlational study was conducted in Nile Delta Region (Damietta, Al Dakahleya, Kafr Al Shaikh, Al Monofeya, Al Gharbeya Governorates), Egypt, at a period of 3 months. Objectives of the study were described thoroughly by researchers individually to candidates then an informed consent was signed prior to start of the work to ensure satisfaction and agreement.

SUBJECTS:

A representative sample of 183 participant from geriatric inhabitants of urban and rural areas in Nile Delta Region, Egypt. Sample size was calculated using Open Epi I program, with power of 80% and confidence interval= 95%.

Criteria of inclusion:

1-community-dwellers from both genders

2-Age of 65 years and more

Criteria of exclusion:

1-Mobility disability

2- intellectual impairment

Study Design:

A correlational study, every participant was required to fill three questionnaires in presence of research team member(s), to evaluate correlation between aspects of the dyspnea scale (indicating poor functionality), fall efficacy scale (indicating fear of falling) and all aspects of the Short Form 36 (indicating QoL).

Tools:

1-Dyspnea 12 (D-12) questionnaire:

The D-12-Arabic contains 12 items that evaluate the intensity of dyspnea via rubric of the physical and emotional aspects of dyspnea. Every rubric element takes a rate from (none) (0), (mild) (1), (moderate) (2), or (severe) (3). The D- 12-Arabic scores (range from 0 to 36, the highest scores denoting more severity of dyspnea) and two elemental scores: physical (with items 1 to 7, and a range of scores from 0 till 21.

2-Fall efficacy scale (FES-I) questionnaire:

The Arabic version of fall efficacy scale -I questionnaire is a self- administrated survey that evaluate the degree of fear of falling through the daily life activities. It consists of sixteen items covering ten original items of the FES evaluating basic daily life activities and six new added items evaluating more physically and socially challenging activities. every item is scored on a 4 points Likert scale: 1 = not at all concerned, 2 = somewhat concerned, 3 = fairly concerned, and 4 = very concerned. Higher values denote more concern about falling. The total score ranges from sixteen to sixty four, with higher scores denoting more concern about falling (9)

3-Short form 36 (SF-36) questionnaire:

The Arabic translated 3- Short form 36 questionnaire is a self-administered common tool to evaluate quality of life. It contains 36 questions. The Scores are translated into a scale of zero- one hundred, where higher scores denote better QoL. The questionnaire was assigned to 8 domains: physical functioning, role–functioning, bodily pain, general health, vitality, social functioning, and role– emotional, and mental health (10).

STATISTICAL ANALYSIS:

Descriptive statistics were presented as frequencies and percentages for qualitative variables, while the mean and standard deviation were used to present the numeric variables. Correlation between different scales was tested using Pearson's correlation coefficient.

For the statistical analysis, IBM SPSS 28 software for windows (*IBM SPSS Inc., Chicago, IL, USA*) was used. P-value < 0.05 is considered statistically significant.

RESULTS:

Table 1. Table 1. Geriatrics group characteristics (N= 183)

	N	%	Mean	SD
Sex				
Male	92	41.3		
Female	91	40.8		
Age			68.19	7.26
Total breathing			13.42	5.47
Total psychological			7.63	3.39
Dyspnea total			20.79	8.18
Falling score			39.89	11.68
Physical Health mean			46.63	19.98
Mental Health mean			53.20	17.96
Physical Mental Aspect mean			47.10	15.93
Total mean			50.08	19.22
Physical functioning (PF) mean			49.08	25.48
Role-physical (RP) mean			34.77	40.53
Bodily pain (BP) mean			56.04	25.62
General health (GH) mean			48.55	16.87
Vitality (VT) mean			45.28	19.19
Social functioning mean			60.68	24.79
Role emotional (RE) mean			49.91	43.35
Emotional wellbeing mean			63.15	18.11

This study included a total number of 138 geriatric. ***Table 1*** shows that about 41.3% of them are males, while the rest are females. Their mean age is 68.19. The mean score of Total breathing is 13.42, Total psychological is 7.63, and dyspnea total score 20.79. The mean of falling score is 39.89, physical health is 46.63, mental health is 53.20, Physical mental aspect is 46.80, and the total mean is 50.08. The mean of Physical functioning score is 49.08, Role-physical mean is 34.77, and bodily pain is 56.04. The mean of general health score is 48.55. The mean score of vitality is 45.28. The mean score of social functioning is 60.68. The mean score of role emotional subscale is 49.91. The mean score of emotional wellbeing is 63.15.

Table 2. Correlation between dyspnea scale, falling scale and SF36 scale.

		Total breathing	Total psychological	Dyspnea total score	Falling scale
Physical functioning (PF) mean	Pearson Correlation	-0.337	-0.296	-0.347	-0.427
	P-value	<0.001	<0.001	<0.001	<0.001
Role-physical (RP) mean	Pearson Correlation	-0.293	-0.192	-0.274	-0.198
	P-value	<0.001	0.009	<0.001	0.007
Bodily pain (BP) mean	Pearson Correlation	-0.316	-0.297	-0.325	-0.425
	P-value	<0.001	<0.001	<0.001	<0.001
General health(GH) mean	Pearson Correlation	-0.399	-0.367	-0.418	-0.359
	P-value	<0.001	<0.001	<0.001	<0.001
Vitality(VT) mean	Pearson Correlation	-0.266	-0.218	-0.266	-0.365
	P-value	<0.001	0.003	<0.001	<0.001
Social functioning mean	Pearson Correlation	-0.307	-0.307	-0.326	-0.339
	P-value	<0.001	<0.001	<0.001	<0.001
Role emotional (RE) mean	Pearson Correlation	-0.271	-0.297	-0.312	-0.22
	P-value	<0.001	<0.001	<0.001	0.003
Emotional wellbeing mean	Pearson Correlation	-0.206	-0.264	-0.264	-0.229
	P-value	0.005	<0.001	<0.001	0.002
Physical Health mean	Pearson Correlation	-0.408	-0.339	-0.411	-0.443
	P-value	<0.001	<0.001	<0.001	<0.001
Mental Health mean	Pearson Correlation	-0.361	-0.368	-0.399	-0.365
	P-value	<0.001	<0.001	<0.001	<0.001
Physical Mental Aspect mean	Pearson Correlation	-0.377	-0.332	-0.388	-0.407
	P-value	<0.001	<0.001	<0.001	<0.001
Total mean sf36	Pearson Correlation	-0.406	-0.368	-0.425	-0.427
	P-value	<0.001	<0.001	<0.001	<0.001

Table 2 shows that in the geriatrics, there was a statistically significant correlation between aspects of the dyspnea scale, fall efficacy scale and all aspects of the SF36. There is a negative correlation between aspects of

the dyspnea scale and SF 36, higher score on dyspnea scale (indicating poor functionality), is associated with lower score on the SF 36 aspects denoting lower quality of life. There is also a negative correlation between fall efficacy scale and SF 36, higher score on fall efficacy scale (denoting higher fear of falling), is associated with lower score on the SF 36 aspects denoting lower quality of life. The corresponding Pearson's correlation coefficient and their p-values are presented in **table 2**.

Table 3. Heat map for the correlation between dyspnea scale, falling scale and SF36 scale

	Total breathing	Total psychological	Dyspnea total score	Falling scale
(PF) mean	-0.337	-0.296	-0.347	-0.427
(RP) mean	-0.293	-0.192	-0.274	-0.198
(BP) mean	-0.316	-0.297	-0.325	-0.425
(GH) mean	-0.399	-0.367	-0.418	-0.359
(VT) mean	-0.266	-0.218	-0.266	-0.365
(SF) mean	-0.307	-0.307	-0.326	-0.339
(RE) mean	-0.271	-0.297	-0.312	-0.22
Emotional wellbeing mean	-0.206	-0.264	-0.264	-0.229
Physical Health mean	-0.408	-0.339	-0.411	-0.443
Mental Health mean	-0.361	-0.368	-0.399	-0.365
Physical Mental Aspect mean	-0.377	-0.332	-0.388	-0.407
TOTAL MEAN	-0.406	-0.368	-0.425	-0.427

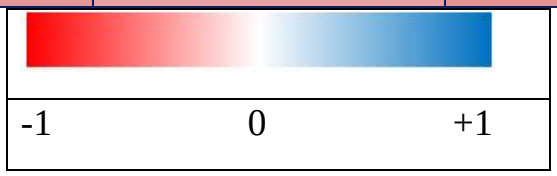

Table 3 shows a heat map for the correlation between dyspnea scale, falling scale and SF36 scale. The darker the color, the stronger the correlation.

DISCUSSION:

This study revealed that in the geriatric population there is a statistically significant correlation between aspects of the dyspnea scale, fall efficacy scale and all aspects of quality of life. There is a negative correlation between aspects of the dyspnea scale and SF 36, higher score on dyspnea scale (indicating poor functionality), is associated with lower score on the SF 36 aspects indicating lower quality of life. There is also a negative correlation between fall efficacy scale and SF 36, higher score on fall efficacy scale (indicating higher fear of falling), is associated with lower score on the SF 36 aspects indicating lower quality of life.

In concordance with the results of our study, (Prata and Scheicher) in 2017 found that there is a relationship between the fear of falling and quality of life and that the higher the fear, worse the quality of life at the female geriatric fallers (11).

Similar results were declared in 2018, where a study of (Bjirk, et al.) showed that a greater score on FES-I, (i.e. increased fear of falling), was significantly associated with a lower score on almost all subscales of SF-36, which indicates decreased HRQOL (12).

Also, in 2020 (McCarthy, et al.) conducted a longitudinal study to assess the relationship between fear of falling and quality of life among older adults in Ireland, found that QoL scores reduced as the burden of falling increased: linear regression models tailored for covariates showed that the elderly having had two or more falling episodes during the last year had a significantly lower CASP-12 score compared to those who had no such episodes ($p = 0.011$) (13).

A possible cause of this relationship is that the fear of falling in geriatric population has been determined as a significant psychological factor. The psychological consequences due to falling, or the prospect of sustaining a fall, may be as disabling as the fall itself or even, more disabling than it (14).

Older people who had fear of falling often had lower confidence in their ability to do activities without falling than those who have no fear of falling and they habitually limit the amount or type of physical activity they perform (15)(16), and this may cause falls(17).

In (Brienne et al.) study to evaluate the associations between a wide range of cardiorespiratory and non-cardiorespiratory impairments and dyspnea in geriatric population, the dyspnea severity was classified using the American Thoracic Society classification. The study revealed that dyspnea due to a multifactorial geriatric health condition in the elderly has an association with several cardiorespiratory and non-cardiorespiratory impairments (18).

In order to evaluate the effectiveness of outpatient comprehensive geriatric assessment consultation and a compliance intervention on 15- month health outcomes. (Reuben et al,) trial investigated 363 elderly individuals, 180 of them in intervention group and 183 in control group. The baseline un-adjustable means of the SF-36 domains for the intervention and control groups were 37.8 and 41.8 as regard physical health, 50.1 and 51.4 as regard the mental health, 68.7 and 71.2 as regard the emotional wellbeing, 73.6 and 78.5 for the role functioning emotional, 48.7 and 56.7 for the energy- fatigue, 75.2 and 82.2 for the social functioning, 59.6 and 64.9 for body pains and 58.1 and 61.8 for the general health respectively (19).

In another study, to compare two self-administrated, one interviewer-administrated and the other is performance-based measure of physical function in geriatrics, (Reuben et al.) recruited 83 subjects to complete SF-36 questionnaire, the means of the subscales were 65.5 for the physical function, 68.6 for the role functioning/physical, 74.8 for the role functioning emotional, 56 for the energy-fatigue, 71.8 for emotional well-being, 72.7 for social functioning, 67.5 for body pains and 63.5 for perception of general health (20).

In China, the modified fall efficacy scale was employed to investigate the falls efficacy and the related predictors of falling among 317 elderlies; recruited from the nursing homes. The results of the falls efficacy questionnaire of the elderly were moderate (7.80 ± 1.17). The falls efficacy questionnaire highest item was (9.12 ± 1.440), and the lowest was (5.77 ± 3.371) (21).

In our study we correlated the results of the three questionnaires, this correlation is done for the first hand, but the correlation between the investigated domains; dyspnea, fear of falling and quality of life; was done in many previous studies. Each research investigated two domains only either the correlation between dyspnea and quality of life or the correlation between the fear of falling and the quality of life.

(Hooshiaran, A. et al.) Plotted a figure (figure 1) to explain the complexity of the relationship between dyspnea and quality of life in geriatric population and to show that there is no direct relationship between the underlying disease and the quality of life.

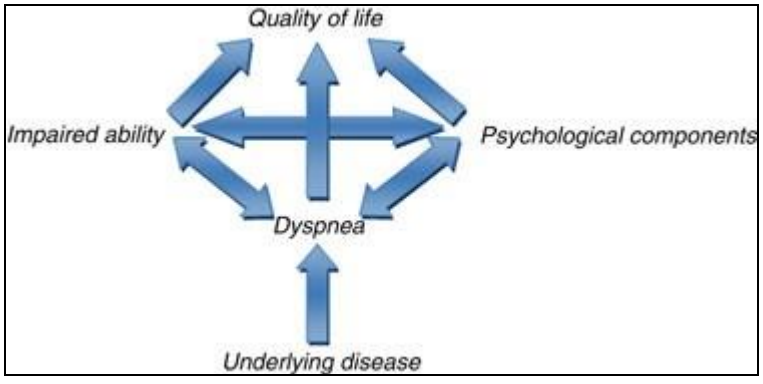

Fig (1): Conceptual model of relationships between dyspnea and other components which affect QOL.

Changes in quality of life are not only dependent on dyspnea and its underlying disorder, but also on impaired ability, psychological components and their mutual interactions. This means that the underlying disorder has no direct effect on quality of life (22).

(Huijnen B et al.) concluded that the dyspnea occurs routinely in the elderly individuals and intervenes with the daily activities and therefor quality of life, through a cohort study on geriatric population in a family health center(23).

In 2022 a quasi-experimental study to evaluate the effects of an 8-week training protocol Training intensity was increased based on overload principle and individual differences in an 8-week training protocol, three times a week for 60 minutes, with selected Fall-proof exercises (multisensory exercises (visual, vestibular, and somatosensory),

center of gravity control, postural strategies, and power training including toe and heel walking, knee flexion and extension, adduction and abduction) on fear of falling and quality of life in the elderly. 24 individuals aged 60-74 were selected using convenience sampling based on inclusion criteria. The subjects were randomly assigned to experimental and control groups. It was concluded that Fall-proof exercises significantly improve quality of life and reduce fear of falling in the elderly. This is observed in improvements in the experimental group (24).

Another 2022 study revealed that reducing fear of falling through improvement of physical functioning and speed of gait is essential for promotion of quality of Life among elderly persons. Regarding fear of falling, lower limp strength, balance, and gait speed in falls prevention programs are excellent tactics to reduce restrictions of physical functioning and to promote independence in geriatric population (figure 2)(25).

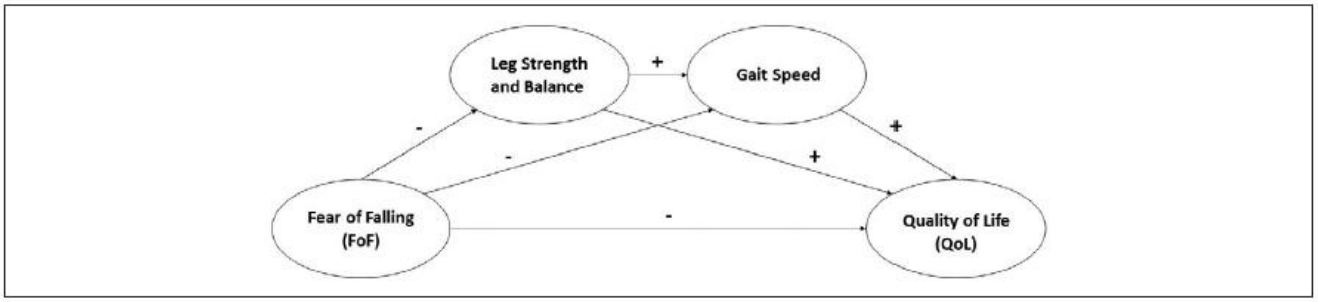

Fig (2): The conceptual multiple-step mediation model. − = hypothesized negative relationship; + = hypothesized positive relationship

Across-sectional survey conducted in 2021explored 114 community-dwelling older adults and older adults residing in the assisted-living facilities (≥65 years, ambulant and well-oriented), Physical activity, fear of falling and quality of life were assessed by the Physical Activity Scale for Elderly, the Modified Fall Efficacy Scale and the Short-form Health Survey (SF-36) questionnaire. This research revealed that there were significant positive correlations ($p< 0.05$) between each pair of Physical activity, fear of falling and QOL for both assisted-living and community-dwelling groups (26).

In 2020, (Gottschalk S et al.) recruited a sample of 309 older individuals to evaluate the fear of falling by the short Falls Efficacy Scale International and Health related Quality of Life by the EQ-5D descriptive system, EQ-5D index, and EQVAS, the study revealed that the prevalence of moderate or high Fear of Falling was 66% of the sample and there was a negative correlation between fear of falling and health related quality of life (EQ-5D index)(27).

In 2019 a systematic review, revealed that there is a link between lower levels of fear of falling and higher levels of health-related quality of life, and this link is independent of the conceptualizations of fear of falling and quality of life (28).

(Çinarli T et al.) In 2017 study, assessed 151 older adults by the Tinetti Falls Efficacy Scale, the Morse Fall Scale, the Nottingham Health Profile, and the Modified Barthel Index. The Prevalence of falls was high (48.3%), as well as fear of falling (63.6%). There was a negative correlation between risk of falling (Morse Fall Scale scores) and ability to perform daily activities (MBI scores; $r = −.50$, $p < .001$)); There was also a negative correlation between fear of falling (Falls Efficacy Scale scores) and ability to perform daily activities (MBI scores; $r = −.79$, $p < .001$). The study concluded that the elderly individuals who have a higher risk of falling are more dependent on others in performing daily activities and have lower quality of life (29).

Finally, with aging the respiratory system changes result in in decrease in the functional reserve volumes and limits the functional capacity which in turn will lead to biological, physical, emotional, social issues and economic problems. The fear of falling among geriatrics is the resultant of many factors as decreased muscle strength, flexibility, postural changes and balance abnormalities. The fear of falling as well as the reduced functional capacity draws on a loss of confidence in performing the daily living activities, cutbacks on social activities, increased reliance on the others, escalates the deconditioning, increases the physical frailty and more limitation in the daily living activities. As a result of both decrease functional capacity and the increased fear of falling results in decline in the quality of life.

CONCLUSIONS

In geriatric population, there is a correlation between dyspnea, fear of falling and quality of life. The correlation is negative between dyspnea and quality of life, higher score on dyspnea scale (indicating poor functionality), is associated with lower score on the SF 36 aspects (indicating lower quality of life). There is also a negative

correlation between fear of falling and quality of life, higher score on fall efficacy scale (indicating higher fear of falling), is associated with lower score on the SF 36 aspects indicating lower quality of life.

ABBREVIATIONS:
COPD: Chronic Obstructive Pulmonary Disease
FES-I: Falls Efficacy Scale–International
SF36: 36-Item Short Form Survey
QoL: Quality of life
PF: Physical functioning
RP: Role-physical
BP: Bodily pain
GH: General health
VT: Vitality
SF: Social functioning
RE: Role emotional
MBI: Modified Barthel Index

DECLARATIONS:

Ethics approval and consent to participate:
A prior ethical approval was obtained from IRB of the relevant institution. All methods were performed in accordance with the relevant guidelines and regulations. The study objectives and design were explained thoroughly by a team member to every candidate then the candidate signed an informed consent in case of acceptance before beginning of the study to ensure complete satisfaction.

CONSENT FOR PUBLICATION:
The authors give consent for the publication of the manuscript and all its appendices and details to be published in a suitable research journal belonging to Springer Nature.

AVAILABILITY OF DATA AND MATERIALS:
The authors declare that necessary data and materials for conducting the study were available.

COMPETING INTERESTS:
The authors declare no conflict of interest nor competing interests.

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