Tabari Biomedical Student Research Journal

OPEN ACCESS

ORIGINAL: Investigation of Stress-Inducing Factors and Preoperative Anxiety and Their Mitigation Strategies from Patients' Perspectives in Surgical Departments of Educational Medical Centers at Mazandaran University of Medical Sciences in 2023

Hodeise Asadpour Sorkhkolaee School of Allied Medical Sciences, Mazandaran University of Medical Sciences, Sari, Iran
Mahsa Mokarrami Rostami School of Allied Medical Sciences, Mazandaran University of Medical Sciences, Sari, Iran
Ali Pahnabi School of Allied Medical Sciences, Mazandaran University of Medical Sciences, Sari, Iran

ARTICLE INFO

Submitted: 14 Jun 2023
Accepted: 20 Aug 2023
Published: 01 Sep 2023

Keywords:
Educational medical centers;
Operating room;
Preoperative anxiety;
Stressors;
Surgery

Correspondence:
Ali Pahnabi, School of Allied Medical Sciences, Mazandaran University of Medical Sciences, Sari, Iran.
Email: chesmabi91@yahoo.com
ORCID: 0000-0002-4136-0550

Citation:
Asadpour Sorkhkolaee H, Mokarrami Rostami M, Pahnabi A. Investigation of Stress-Inducing Factors and Preoperative Anxiety and Their Mitigation Strategies from Patients' Perspectives in Surgical Departments of Educational Medical Centers at Mazandaran University of Medical Sciences in 2023. Tabari Biomed Stu Res J. 2023;5(2):25-32.

10.32598/tbsrj.v5i2.10533

ABSTRACT

Introduction: In light of the progress made in anesthesia and surgical procedures resulting in fewer complications and greater success rates, preoperative stress and anxiety persist among patients. This study aimed to evaluate stress-inducing factors and preoperative anxiety and explore strategies for their mitigation among surgical patients.

Material and Methods: This descriptive-analytical study was conducted in 2023 on 375 surgical patients in the operating room departments of educational medical centers affiliated with Mazandaran University of Medical Sciences. Simple random sampling was employed and a questionnaire designed by the researchers was used to collect data (with Cronbach's alpha reliability coefficient of 0.81). The data were analyzed via SPSS 20 software.

Results: The study revealed that 60% of the total participants were male, with a mean age of 40 years. Moreover, 72% of the participants were married. The preoperative stress factors had a mean score of 7.29, with the next most significant factors being stress-inducing factors related to the department (19.6%), followed by stress-inducing factors related to the surgical staff (13.2%), and stress-inducing factors from the physical environment of the operating room (11.4%).

Conclusion: The final results of this study suggest that by identifying influential factors on preoperative stress and addressing them, it is possible to minimize preoperative anxiety. Therefore, it is recommended to develop educational programs for physicians and personnel to alleviate stress-inducing factors and provide patients with essential information about surgical complications, the surgical process, and anesthesia procedures.

Introduction

Stress and anxiety constitute distressing mental states or feelings of unease related to threatening situations or unforeseen apprehensions about oneself or others. It is the most common emotion experienced by all humans. In such states, an individual is not at ease and feels under pressure (1). If anxiety persists for an extended period, it can lead to various complications and issues, including delays in

[DOI: 10.32598/tbsrj.v5i2.10533]

recovery (2, 3). Anxiety becomes especially severe when an individual cannot successfully adapt to conditions and events (4, 5).
Surgery is consistently a significant experience for patients and their families, often accompanied by stress and anxiety as natural responses (6). This is due to the fact that all types of surgeries are considered a threat to bodily integrity and life (7). Non-pharmacological interventions generally pose fewer risks for patients and can reduce anxiety, potentially leading to the discontinuation or reduction of drug consumption (8, 9). One of the earliest anxiety-inducing factors is fear of the unknown and postoperative pain, and this fear diminishes to some extent with knowledge of what will happen. Even family members, if unable to change stress-inducing circum-stances, can help reduce anxiety by listening to the patient and offering behaviors necessary for anxiety relief (10). Generally, three types of nursing interventions are considered effective in reducing anxiety: 1) educating the patient and identifying preoperative anxiety-provoking factors, 2) employing relaxation techniques, and 3) familiarizing the patient with the causes of anxiety (11). Therapeutic communication, patient education, and prescribing beta-blockers can suppress the sympathetic system and reduce anxiety. Most patients consider the provision of necessary information by the surgeon regarding surgical complications to be effective in managing stress. A surgeon's adequate and appropriate explanation about tests and treatment procedures instills confidence in the patient, after which the surgical plan, its risks, and potential consequences are explained comprehensibly to the patient and their relatives.
In conducted studies, fears of separation from the family and previous activities, financial difficulties, family responsibilities, undesirable preoperative notifications, and postoperative disabilities played a role in generating anxiety (12). Psychological counseling sessions, instructional videos, patient visits to individuals who have previously undergone surgery, playing music before surgery, and acquainting patients with operating room personnel and equipment are among the measures recommended in various countries to reduce preoperative anxiety (13). Given that understanding patients' perspectives on stress-reduction strategies is crucial, and considering that these strategies may vary across different cultural contexts, this study aims to evaluate stress-inducing factors and preoperative anxiety and their mitigation strategies among surgical patients in educational medical centers affiliated with Mazandaran University of Medical Sciences in 2023.

Methods

This descriptive-cross-sectional study was conducted in 2023 with the aim of identifying stress-inducing factors and preoperative anxiety and exploring their mitigation strategies from the patients' perspectives in the operating rooms of educational medical centers including Imam Khomeini (RA) Sari Hospital, Bu-Ali Sina Sari Hospital, Hazrat Fatemeh Zahra (SA) Cardiac Center Sari, and Zareh Burn and Reconstruction Hospital Sari. The minimum sample size with a 95% confidence level was estimated to be 375 individuals, and simple random sampling will be employed. Data will be collected within 24 hours after surgery, at the bedside of the patient in the ward.
The data collection tool in this study was an adapted and modified questionnaire from a study of Nazari-Vanani et al. (11). The questionnaire consisted of three sections: The first section included 7 questions related to demographic information such as gender, age, type of surgery, surgical history, education level, occupation, and marital status. The second section of the questionnaire, which was developed and modified based on the study by Nazari-Vanani et al. (11) and underwent further adjustments, comprised 26 questions. This section evaluated stress-inducing factors and preoperative anxiety from the patient's perspectives. The third section examined anxiety-mitigating factors from the patients'

[DOI: 10.32598/tbsrj.v5i2.10533]

perspectives and included 9 questions. The validity and reliability of second and third sections were confirmed by Nazari-Vanani et al. (11), who reported a Cronbach's alpha reliability coefficient of 0.81. However, considering the changes and adjustments made in this study, the new questionnaire was content validated with the determination of Content Validity Ratio (CVR) by 10 expert professors and experienced operating room specialists. To confirm the reliability of this tool, internal consistency of the explored questions was assessed using the Cronbach's alpha coefficient. Additionally, using the kappa correlation coefficient, a retest was conducted among 10 patients one week apart. The questionnaire items were scored on a Likert scale, ranging from "very high," "high," "neither low nor high," "low," "very low," to "not at all." Subsequently, scores from 0 to 5 are assigned to these options.

All surgeries in the studied samples were performed under general anesthesia. All subjects were in a suitable state to provide reliable answers to the questionnaire. By suitable state, it is meant that the patient should have had the capability to give trustworthy responses to the questionnaire. Finally, the collected data were analyzed using appropriate statistical tests in the SPSS 20 software.

Results

The findings of this study revealed that 60% (225 individuals) of the participating patients were males, and the rest were females. The mean age of the study participants was 40 years. Of the participants, 72% (270 individuals) were married. Independent t-test for measuring the level of anxiety showed that preoperative anxiety was significantly higher in female patients compared to male patients ($P<0.05$). Additionally, the results showed that the fear of pain after surgery had the highest prevalence among preoperative concerns, contributing to 48% of the overall anxiety levels for the patients. The second most common concern was worry about the surgical outcome, accounting for 30.5% of the anxiety levels. Interestingly, 22.5% of the patients perceived the fear of surgery itself as a significant contributor to their preoperative anxiety. It was also noted that marital status had an impact on the level of anxiety, with unmarried individuals experiencing higher levels of anxiety.

Regarding occupation, 45.3% (170 individuals) of the surveyed sample were employed, and in terms of education level, 69.6% had a diploma or higher education, while 8.26% were illiterate. Moreover, 49.3% of the patients had a history of previous surgeries, which did not lead to a reduction in preoperative stress for them. Independent t-test to assess the level of stress before surgery based on the type of previous surgery indicated a significant difference in stress levels among patients with different surgical histories. Furthermore, 6.4% of the patients had experienced a breach of privacy during surgery preparation, and this breach significantly affected their stress levels. The study also found that the type of surgery had a significant impact on the level of preoperative stress and anxiety.

Among the preoperative concerns, fear of postoperative pain had the highest impact on anxiety, affecting 48% of patients. The second most influential factor was the fear of surgical outcomes, contributing to 30.5% of anxiety levels. Additionally, 22.5% of the patients attributed fear of surgery itself to their preoperative anxiety, and 21.3% believed that lack of privacy during the preparation phase was a major contributor. Moreover, 19% of the patients attributed their anxiety to lack of information about the duration and procedure of surgery (***Table 1***).

Regarding stress-inducing factors related to the care provided in the surgical department, the most impactful factors were transfer to the operating room and waiting to enter the operating room. Furthermore, the most significant stress-inducing factor related to the operating room staff was the transfer of patients to the operating table. The study also indicated that the highest prevalence of

[DOI: 10.32598/tbsrj.v5i2.10533]

surgery types was orthopedic surgeries, which showed a significant difference in average stress and anxiety levels based on the type of surgery (***Table 2***).

Table 1. Strategies for modulating stress-inducing factors for patients in the operating room

Strategies for mitigating stress-inducing factors	N (%)
1. Provision of essential information by surgeons and assistants regarding surgical procedure details and potential complications to the patient.	168 (44.8)
2. Offering necessary information by anesthesia specialists regarding postoperative anesthesia process and potential effects to the patient.	161 (42.9)
3. Explanation by operating room personnel and nurses about the reason for removing clothing and assuring the patient regarding privacy preservation.	158 (42.1)
4. Attending to frail patients in a dedicated isolation area, segregating the pathway of patient entry to the operating room and recovery.	137 (36.5)
5. Reassurance by operating room nurses regarding continuous care and administration of pain relief to the patient after the surgery.	125 (33.3)
6. Granting permission for patient's visitors to meet with them in the hours leading up to the surgery.	98 (26.1)
7. Familiarizing the patient with the operating room environment prior to the surgical procedure.	61 (16.3)
8. Establishment of enhanced telephonic facilities for patients.	24 (6.4)
9. Providing installment payment options for hospital expenses in cases of high financial burden.	9 (2.4)

The findings also highlighted the stress-inducing factors related to the physical environment of the operating room, including observing the surgical table (28.1%), entering the unfamiliar environment of the operating room (24.2%), seeing unfamiliar medical devices (18.3%), noise from the operating room staff (16.8%), observing the surgical light above the patient's head (16.4%), and experiencing cold air and poor ventilation (12.6%). Consequently, the study recommended that the most effective way to mitigate stress-inducing factors in the operating room is to provide necessary information to the surgeon and anesthesiologist about the potential complications, outcomes, and surgical conditions (***Table 3***).

Table 2. Frequency of stress-inducing factors in relation to operating room personnel

Stress-inducing factors in relation to operating room personnel	N (%)
1. Patient transfer onto the surgical bed	120 (32)
2. Observation of attendants and special surgical attires and instruments	108 (28.8)
3. Observing interactions of unfamiliar individuals (staff and physicians)	98 (26.1)
4. Patient's solitary presence in the operating room	74 (19.7)
5. Injection of serum and anesthetic drugs into the patient	62 (16.5)
6. Placement of anesthetic mask over the patient's face	62 (16.5)
7. Patient transfer using a stretcher and wheelchair into the operating room	42 (11.2)
8. Conversations among operating room personnel regarding the patient	37 (9.9)
9. Hearing unfamiliar medical terminologies from operating room personnel and physicians	23 (6.1)
10. Banter and jokes among operating room staff and physicians with each other and the patient	9 (2.4)

Table 3. Frequency of stress-inducing factors related to care provided in the surgical department

Factors of stress amplification in conducted care unit	N (%)
1. Transition to preoperative and entry into the operating room	106 (28.3)
2. Anticipation of entering the operating room	106 (28.3)
3. Administration of medications and preoperative vascular route verification	87 (23.2)
4. Clipping of hair on the surgical site skin area	42 (11.2)
5. Removal of watches, ornaments, and prosthetic devices	38 (10.1)
6. Wearing sterile attire for the operating room	35 (9.3)
7. Informed consent form signing for the surgery	21 (5.6)
8. Feelings of embarrassment and shyness regarding the preparation process	14 (3.7)
9. Prohibition of fluid and food consumption from the evening prior to the surgery	11 (2.9)
10. Securing identification bracelet on the wrist and affixing it to the chest	9 (2.4)

[DOI: 10.32598/tbsrj.v5i2.10533]

Discussion

The apprehension associated with medical treatments constitutes a significant concern across various tiers of healthcare delivery. This concern remains salient even before contemplating surgical interventions, particularly in cases where the ailment exhibits sporadic manifestations (14, 15), and both the patient and the healthcare practitioner encounter challenges in accurately diagnosing the condition. This predicament becomes markedly more pronounced when the affliction necessitates surgical intervention, thereby exacerbating the distress experienced by patients (16). The preoperative phase is marked by a significant degree of patient apprehension and anxiety. This study delved into the factors contributing to preoperative stress and their effects on patients undergoing surgical procedures. The analysis revealed that the highest magnitude of stress emanated from concerns preceding surgery, constituting an average of 29.7%. This was closely followed by stress-inducing factors and care provisions within the clinical department, accounting for 19.6%. Additional stress-inducing factors were identified in the context of interactions with operating room staff (2.13%) and the inherent stressors within the physical environment of the operating room (11.4%).

Among the spectrum of concerns preceding surgery, the foremost trigger for anxiety was the fear of postoperative pain, which resonated at a remarkable 58.9%. These findings parallel the conclusions drawn from a study titled "Preoperative anxiety in hospitalized patients: A descriptive cross-sectional study in 2019", where 66 individuals (44%) underscored the fear of postoperative pain as their primary preoccupation (1). This underscores the significance of educating patients about pain management to attenuate their stress levels. However, contrasting outcomes have surfaced, underscoring that such education may inadvertently heighten anxiety and trepidation in certain cases (17, 18).

The study revealed that 19% of participants were uninformed about the anticipated duration of their surgical procedure. Moreover, 21.3% identified breaches of privacy by operating room staff as factors exacerbating their anxiety.

Addressing the influence of patient education, Coob conducted a study involving cardiac surgery patients to comprehend anxiety-inducing elements and potential management strategies. Their findings elucidated that patients often grapple with moderate to severe anxiety, exacerbated by factors such as unfamiliarity with the surgical milieu and potential consequences (19). Notably, providing pertinent training on surgical complications and consequences by the anesthesiologist and surgical team emerged as a pivotal intervention to ameliorate stress levels. This conclusion finds resonance in the outcomes of studies conducted by previous studies (20-23).

Educational interventions wielded substantial influence in reducing average anxiety levels across these studies. It stands to reason that preoperative patient education, encompassing comprehensive elucidation of prospective problems and care regimens, can effectively forestall stress by elucidating the stressors and mitigating their impact. This, in turn, augments recovery quality and truncates hospital stays, curbing operation-associated complications. A noteworthy facet was the prevalence of financial concerns, with 11.7% of patients apprehensive about hospital expenses. Offering flexible payment options for escalated costs could potentially serve as a salient stress mitigation strategy. It is also important to note that a history of prior surgery does not appear to uniformly abate preoperative anxiety. According to the independent t-test, anxiety reduction is only evident when patients possess favorable past surgical experiences. Conversely, a negative outlook, coupled with anesthesia-related issues or surgical failures, exacerbates preoperative anxiety (24)

In the swiftly evolving landscape of infectious diseases, one recent menace has captivated global attention, this viral interloper has become the focal point of our

[DOI: 10.32598/tbsrj.v5i2.10533]

era's health concerns. This article delves into the multifaceted dimensions of the virus's impact and the strategies deployed to counter it, within the context of the investigation into stress-inducing factors and preoperative anxiety among patients in the surgical departments of educational medical centers affiliated with Mazandaran University of Medical Sciences in 2023.

Initially identified as a perpetrator of severe respiratory illness, SARS-CoV-2's influence extends far beyond the pulmonary domain. (25). The virus has demonstrated an ability to infiltrate diverse physiological systems, including the heart, eyes, and neurological networks (26). Moreover, reports have surfaced indicating its adverse effects on the kidneys, menstrual cycle (27), and gastro-intestinal tract (28), broadening the scope of its impact and challenging conventional medical paradigms.

In response to this global turmoil, strategic measures have been implemented to curtail the virus's spread and mitigate its reper-cussions. Quarantine and social distancing have emerged as linchpin strategies, fundamentally altering social dynamics in an attempt to shield vulnerable populations and diminish transmission rates (29). An innovative approach involves the transfer of antibodies from convalescent patients to those currently battling the virus, offering a potential lifeline in the absence of definitive treatments.

Despite these measures, the beacon of hope remains vaccination. Undoubtedly, immun-ization stands as the most potent prophylactic weapon against this pervasive threat. With the potential to curtail transmission chains and elicit population-wide immunity, widespread vaccination campaigns have emerged as the paramount defense strategy (30). The pursuit of normalcy and the restoration of societal equilibrium pivot on the success of vaccination efforts.

The present article situates these vital insights within the overarching framework of stress-inducing factors and preoperative anxiety among patients in the surgical departments of educational medical centers affiliated with Mazandaran University of Medical Sciences. As the year 2023 unfolds, the lessons gleaned from the COVID-19 crisis underscore the significance of a holistic approach to healthcare—one that encapsulates not only the physical dimensions of diseases but also the psychological and societal facets that intertwine with them.

Conclusion

Given the variance in patient perceptions of stressors and the multiplicity of clinical stressors inherent in surgical settings, it is imperative for medical practitioners and nurses to remain cognizant of these anxiety-inducing factors. Sufficient educational planning is warranted to enhance patient awareness levels. Importantly, as patient anxiety prominently emanates from preoperative concerns, it becomes incumbent on physicians to meticulously furnish comprehensive insights into surgical complications. Through these measures, patients can be better equipped to navigate the preoperative period with reduced stress and heightened confidence.

Ethical standards statement

This study was approved by the Ethics Research Committee of Mazandaran University Medical Science.

Conflicts of interest

None to declare.

Authors' contributions

All authors participated in the design of the study and approved the final version of the manuscript.

References

1. Rastgarian A, Esmaealpour N, Javadpour S, Sadeghi SE, Kalani N, Sepidkar AA, et al. Preoperative anxiety in hospitalized patients: A descriptive cross-sectional study in 2019. medical journal of

[DOI: 10.32598/tbsrj.v5i2.10533]

mashhad university of medical sciences. 2020;63(1):2209-18.
2. Swindale JE. The nurse's role in giving pre-operative information to reduce anxiety in patients admitted to hospital for elective minor surgery. Journal of Advanced Nursing. 1989;14(11):899-905.
3. Kapnoullas J. Nursing interventions for the relief of preoperative anxiety. The Australian journal of advanced nursing: a quarterly publication of the Royal Australian Nursing Federation. 1988;5(2):8-15.
4. Aliakbari Dehkordi M, Kakojoibari AA, Mohtashami T, Yektakhah S. Stress in mothers of hearing impaired children compared to mothers of normal and other disabled children. Bimonthly Audiology-Tehran University of Medical Sciences. 2011;20(1):128-36.
5. Nigussie S, Belachew T, Wolancho W. Predictors of preoperative anxiety among surgical patients in Jimma University specialized teaching hospital, South Western Ethiopia. BMC surgery. 2014;14:1-10.
6. Ghardashi F, Saleh MA, Hasanabadi H, Setayesh Y. Study of the relationship between pre-operative waiting time and anxiety in patients. Journal of Sabzevar University of Medical Sciences. 2004;10(4): 76-84.
7. Ghanei RG, Rezaei K, Mahmoodi R. The relationship between preoperative anxiety and postoperative pain after cesarean section. The Iranian Journal of Obstetrics, Gynecology and Infertility. 2013;15(39):16-22.
8. Rezaei K, Ghanei R. Effect of yoga program on anxiety in Breast cancer patient undergoing chemotherapy. Jentashapir 2013; 4(1):41-51.
9. Babashahi, Fayazi, Aghel, Haghighizadeh. Effect of aromatherapy on anxiety level among preoperative patients. Scientific Medical Journal. 2010;9(5):406-516.
10. Yaghoubi H, Riahi S. Flight stress and how to overcome it. Ebnesina. 2007;10(2): 39-42.
11. Nazari-Vanani R, Rahimi-Madiseh M, Drees F. Evaluation of preoperative anxiety and stress, and ways to modify it, the patients in Kashani hospital operating room in 2013. Journal of Clinical Nursing and Midwifery. 2014;2(4):53-60.
12. Ghanei Gheshlagh R, Dastras M, Fazlali PourMiyandoab M, Naseri O. The relationship between preoperative anxiety and postoperative nausea and vomiting. Medical Science Journal of Islamic Azad Univesity-Tehran Medical Branch. 2014; 23(4):269-74.
13. Bagheri H, Ebrahimi H, Abbasi A, Atashsokhan G, Salmani Z, Zamani M. Effect of preoperative visitation by operating room staff on preoperative anxiety in patients receiving elective hernia surgery. Journal of PeriAnesthesia Nursing. 2019;34(2):272-80.
14. Davoodi L, Kazeminejad A, Abdollahi A. Rare skin manifestation of Mycobacterium marinum, lesion on shoulder: a case report. MOJ Clin Med Case Rep. 2022; 12(3):44-5.
15. Abdollahi A, Kadkhodaee R, Kazeminejad A, Davoodi L, Karimi MO, Razavi A, et al. Topical Formulation Based on Arnebia euchroma as a Novel Possible Efficient Treatment on Epidermolysis Bullosa Lesions: A Case Series of Fourteen Patients. South East European Journal of Immunology. 2023;6(1):56-61.
16. Razavipour M, Akhlaghi H, Abdollahi A. Overcoming diagnostic challenges in desmoplastic fibroma of the scapula: a rare case report. Oxford Medical Case Reports. 2023;2023(8):280-3.
17. Lin LY, Wang RH. Abdominal surgery, pain and anxiety: preoperative nursing intervention. Journal of advanced nursing. 2005;51(3):252-60.
18. Zakerimoghadam M, Aliasgharpoor M, Mehran A, Mohammadi S. Effect of Patient Education about Pain Control on Patients' Anxiety Prior to Abdominal Surgery. Hayat. 2009;15(4):13-22.
19. Coob M. A Strategies for teaching in patients ongoing coronary bypass surgery. Nursing Research. 2001;6:57-62.
20. Mahmoudi H, Ebadi A, Salimi SH, Najafi Mehri S, Mokhtari Noori J, Shokrollahi F. Effect of nurse communication

[DOI: 10.32598/tbsrj.v5i2.10533]

with patients on anxiety, depression and stress level of emergency ward patients. J Crit Care Nurs. 2010;3(1):3-4.
21. Danino AM, Chahraoui K, Frachebois L, Jebrane A, Moutel G, Herve C, et al. Effects of an informational CD-ROM on anxiety and knowledge before aesthetic surgery: a randomised trial. British journal of plastic surgery. 2005;58(3):379-83.
22. Belleau FP, Hagan L, Masse B. Effects of an educational intervention on the anxiety of women awaiting mastectomies. Canadian Oncology Nursing Journal/Revue canadienne de soins infirmiers en oncologie. 2001;11(4):177-80.
23. Ayral X, Gicquere C, Duhalde A, Boucheny D, Dougados M. Effects of video information on preoperative anxiety level and tolerability of joint lavage in knee osteoarthritis. Arthritis Care & Research. 2002;47(4):380-2.
24. Ghardashi F. Factors affecting preoprative anxiety. Koomesh. 2007;8(3): 123-30.
25. Abdollahi A, Naseh I, Kalroozi F, Kazemi-Galougahi MH, Nezamzadeh M, Frouzanian M, et al. Is there an Association between Side Effects of AstraZeneca, Sputnik, Covaxin and Sinopharm COVID-19 vaccines and Breakthrough Infections? Tabari Biomedical Student Research Journal. 2022;4(2):23-30.
26. Frouzanian M, Jafarpour H, Razavi A. Multiple sclerosis and COVID-19 as two triggers of conjunctivitis: a case report. MOJ Clin Med Case Rep. 2023;13(1):17-9.
27. Abdollahi A, Naseh I, Kalroozi F, Kazemi-Galougahi MH, Nezamzadeh M, Billandi SS, et al. Comparison of side effects of COVID-19 vaccines: sinopharm, astraZeneca, sputnik V, and covaxin in women in terms of menstruation disturbances, hirsutism, and metrorrhagia: a descriptive-analytical cross-sectional study. International Journal of Fertility & Sterility. 2022;16(3):237.
28. Abdollahi A, Naseh I, Kalroozi F, Kazemi-Galougahi MH, Nezamzadeh M, Qorbanzadeh A, et al. Potential adverse effects of covid-19 vaccines on Iranian healthcare workers: Comparison of four available vaccines in Tehran: A retrospective cross-sectional study. Oman Medical Journal. 2023;38(2):e486.
29. Abdollahi A, Naseh I, Galougahi MHK, Kalroozi F, Nezamzadeh M, Khajevand N, et al. Side Effects of the Sinopharm/BBIBP COVID-19 Vaccine among Iranian Healthcare Workers: A Gender Assessment. Iranian Red Crescent Medical Journal. 2022;24(8):e1974.
30. Abdollahi A, Naseh I, Kazemi-Galougahi MH, Kalroozi F, Nezamzadeh M, Feyzollahi M, et al. Comparison of four types of vaccines Sinopharm, AstraZeneca, Sputnik V, and Covaxin in terms of morbidity and severity of COVID-19 in vaccinated personnel of several selected medical centers, Tehran, Iran. International Journal of Medical Investigation. 2022;11(2):56-65.

[DOI: 10.32598/tbsrj.v5i2.10533]