Journal of Engineering, Science and Technological Trends (JESTT)

Vol. 1, Issue 1, February 2024
DOI: https://doi.org/10.48112/jestt.v1i1c.3

Article

New aspect of Management Engineering: Connotation between FDI Inflow, Gender Gap, Educational Attainment and Skilled Workforce

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Received: 06 January 2024 / Revised: 23 February 2024 / Accepted: 25 February 2024 / Published Online: 29 February 2024

ABSTRACT

This research aimed to investigate and explore the empirical relationship between foreign direct investment (FDI) and the workforce at different educational levels. Additionally, it sought to enable national assessments of education statistics and indicators using widely accepted definitions. Pakistan is examined in this analysis. The empirical results imply that inward FDI is positively influenced by a workforce with higher education. Higher education tends to have the biggest impact; nevertheless, educational levels are not equally significant. In terms of gender, it appears that the proportion of women in the workforce is important for drawing foreign direct investment (FDI), consequently the authorities ought to develop measures which promote the equality of women.

Keywords*:* Skilled Workforce; Foreign Direct Investment; Gender Gap; Higher Education

1. Introduction

A majority of individuals agree that foreign direct investment (FDI) is good for a nation's fundamental prosperity. Both the host economy (inward FDI) and the home economy (outward FDI) benefit greatly from FDI [1]. Because FDI flows are regarded as investments for the future, albeit being less frequent than the flows from investment portfolios. Because foreign direct investment (FDI) has so many good consequences on the development of nations, particularly recipient countries, governments worldwide aim to expand FDI flows [2]. These benefits include a generation of jobs, a rise in the efficiency for national enterprises, and the transmission of technological expertise to the local business sector. Furthermore, and mostly in industrialized nations, FDI increases workforce competence by introducing innovative technologies and providing educational opportunities for managers [3].

Numerous studies have looked at the primary factors that affect FDI flows into a host nation. Durham [4] and Alfaro et al. [5], for instance, concentrated on the relationship between the FDI effect and the health of the host nation's domestic financial markets. Both discovered that the only nations that benefited from FDI were those with advanced banking and financial systems [6]. Durham [7] also discovered that the benefits of foreign direct investment (FDI) on growth were limited to nations with robust institutional development and a legal framework that supported investors. The study of human capital factors has grown recently, in addition to the so-called classic criteria like labor and size of the marketplace, investment needs, and the affordability of consumers.

More specifically, education [8] is seen to be crucial for a nation's economic development, and the majority of experts suggest that it also has a favorable correlation with foreign direct investment (FDI) flows [9]. However, we consider it intriguing to compare men and women when examining Pakistan's educated workforce when differences in gender are taken into consideration in our research. In Pakistan as a whole the proportion of girls obtaining secondary and advanced education [10] is almost the same as that of males. Research on gender and sustainable development conducted in Pakistan indicates that a greater percentage of males compared to women have obtained higher education degrees. In addition to 67% of males in the identical age range, 42% of women

aged 25 to 35 have completed higher education on aggregate. Over fifty percent of the total university degrees in most of Pakistan are given to men. But there is a noticeable disparity when it comes to the percentage of women who are employed. Based on available data, the average percentage of working women in Pakistan is around 26%, whereas the percentage of working males is 84%. Gender inequality is currently extremely substantial, notably in remote regions of the nation, and women have experienced marginalization owing to a variety of religious, political, and socioeconomic variables [11].

Pakistan has been the primary recipient of FDI in the past few years. a stable political system, an emphasis on exports, R&D incentives, the uptake of innovative technologies, along with a high level of scientific proficiency are characteristics of industrialized nations. These circumstances make it easier for large multinational companies to invest in people and skills, regardless of whether promptly (professional education) or by proxy (a basic understanding transmission to local enterprises) [6],[7],[8],[9],[10],[11],[12]. As a result, competence convert an essential component in manufacturing that fosters technological advancement and knowledge sharing.

Education is a significant component influencing human capital, aside from health. Numerous empirical investigations have looked at way they both relate. For Weil [13], investing in academic achievement is a way of improving the talent pool. According to Hanushek and Woessmann [14], the primary reason for Latin America's sluggish economic growth is the region's poor cognitive skill levels. Furthermore, Hanushek and Woessmann [15] demonstrated that a two-percentage point rise in the yearly GDP per capita was associated via a rise in the literacy and mathematical ability measure results' median deviation. Across a related study, Lopez et al. [16] looked at how economic and educational changes were distributed across India and other Latin American and East Asian nations. They uncovered that the expected rate of interest remained nearly three percentage points higher in nations with both a free-trade system and employment opportunities with greater levels of education than in those with just one of the two aforementioned characteristics. According to Barro [17], a gender-neutral educational framework subsequently boosts human capital, which is favorably correlated with the return-on-investment rate.

This empirical analysis set out to accomplish two goals. Its initial goal was to investigate how inward FDI was impacted by the workforce's primary, secondary, and higher education. In terms of enacting of creative reforms, its second goal was to evaluate this effect differently for men and women and to produce insightful statistical data for scholars, decision-makers, and Pakistani authorities.

Solow's growth accounting technique was updated by pioneering scientific research on the FDI–growth nexus [18]. A Solow model that was enhanced by this method was primarily centered on manpower, capital, technology, and inbound foreign direct investment. Subsequently that time, the majority of studies have tried to investigate how FDI affects the country's growth. According to the empirical research on foreign direct investment (FDI), one of the essential components of inbound FDI is human capital [19],[20],[21]. Nevertheless, there haven't been many cross-national studies done to pinpoint the kind of personnel that serve as strong motivators for overseas stockholders.

2. Literature Review

There is controversy in the quantitative research field. Researches have demonstrated that education has either an advantageous or detrimental impact on foreign direct investment (FDI). For instance, Narula [22] found that in 22 developing nations under study, the proportion of people in a population with a higher education level was not an empirically significant predictive factor for influxes of FDI. Mody et al. [23]made an effort to pinpoint the traits of Japanese businesses most likely to make foreign investments in important Asian nations as well as other regions of the globe. One of their primary conclusions was that academic accomplishment proved not always the best indicator of human capital.
On the other hand, a number of qualitative investigations have identified beneficial relationships among FDI and academic achievement. The emergence of FDI's distinctive attributes was examined by Paloni et al. [24], who also conducted an empirical test of the theory that FDI's geographical dispersion is influenced by the amount of human capital in the destination country. The researchers discovered that, over the course of time, human capital became a more important predictive predictor of foreign direct investment inflows.

Because the West Midlands and Scotland have been more successful than other regions in luring foreign direct investment (FDI) inflows, Fallon et al. [25] used data from those locations. According to their findings, FDI in the West Midlands was positively impacted by education more than would have been predicted. This suggested that industries with a considerable amount of human capital and support from the government preferred to draw a higher percentage of FDI from outside. Furthermore, resource-related elements, such a professionally educated, adaptable staff, seemed to be crucial. In the opinion of Kyaw [26], local companies may boost the influence of FDI on the amount of capital invested in an economy by raising the general competence level of their workforce (via a mix of beneficial training facilities and rewards supplied to employees). Additionally, corroborated by the results above is the link between education and FDI.

Gender inequalities in education were not taken into account by Shatz [27], who concentrated on education as a factor influencing FDI. The key conclusion was that FDI was drawn to workers with higher levels of education. It was also discovered that the impacts of education may be distinguished from those of general economic progress. Tavares and Teixeira [28] investigated if FDI may be significantly influenced by human capital. Their research was based on primary information gathered from an extensive survey of Portuguese enterprises. Two significant factors were controlled: (i) the percentage of "the highest proficient" employees across the entire staff, with the percentage of engineering professionals working as an indicator for the highest qualifications; and (ii) the amount of "the highest trained." Regulations over the company's basic features (size, age, and industry) and intended parameters (R&D and export intensities) contained both of these parameters. Workforce relative to all job opportunities, with the percentage of employees with at least twelve years of college education serving as a proxy for elite education. According to their findings, FDI attractiveness is positively and significantly impacted by human capital.

Nunnenkamp and Spatz [29] conducted a nationwide analysis and concluded that having highly skilled staff is essential. Upon examining a record-breaking amount of nations which accommodate and originate FDI, the researchers assumed that overseas venture capitalist would be more probable to select regions with modest gender disparities in educational possibilities. The degree of education of the workforce was one of the important characteristics that Nonnemberg and Mendonca[30] discovered when they looked at 33 nations, including transition economies, between 1975 and 2000. In order to achieve economic growth, it was discovered that one of the most important parameters of inward FDI was the level of worker qualification.

In the context of South Asia, Khan [31] investigated the relationship between the globalization, business viability, and ad-

vancement of human resources. He emphasized that having a variety of talents enabled people, companies, and institutions to take advantage of the fresh possibilities brought about by globalization. Moreover, the ability of the nations in the area to thrive in the international marketplace and draw foreign direct investment has been impacted by the presence of trained and innovative workers.
There is an occupation disparity in many economies that are developing, where women confront several barriers in the job due mostly to cultural and religious disagreements or political and societal situations. The following covers both those who belong to the Mexico and Turkey as well as nations like North Korea and India. Women still endure discrimination, beyond certain parts of European nations.

Women's involvement is emphasized as a key indicator of a nation's overall progress in several theoretical and empirical researches. Only a handful has raised the contrary assertion, mostly on the grounds of decreased fertility. In fact, new research from Pakistan demonstrates that nations with greater percentages of part-time female work also typically have a greater share of total female employment [32]. Therefore, laws designed to remove barriers to part-time employment may result in a rise in the number of female participants[33],[34]. According to Cabeza-Garcia et al. [35], the two primary drivers of inclusive economic growth were increased participation to the work force and better levels of educational attainment for women.

Borensztein et al. [36] discovered that local manpower restrictions reduced the development impacts of foreign direct investment (FDI) with respect to gender roles in schooling. Females with higher levels of education and competence might assist in removing these barriers, which would increase FDI inflows and boost economic growth. Furthermore, Nunnenkamp and Busse [37] provided evidence in favor of the theory that foreign investors would gravitate towards areas with low gender gaps in education across a wide range of industrialized and developing nations. In fact, the gender gap in schooling deterred foreign direct investment (FDI) from developed to reasonably develop (middle income) emerging nations.

The term "womenomics" was originally used by Matsui et al. [38] to describe how important women are to the growth of their country. Since then, a number of researchers have examined the effect of gender disparities on economic development, including Dollar and Gatti[39], Yamarik and Ghosh [40], and Evenon et al.[41]. They have come to the conclusion that racial inequalities with regard to education have an adverse effect on the female job opportunity percentage and, as a result, GDP levels. Lo¨fstro¨m [42] and Aguirre et al. [43], concentrating on the EU, discovered a positive and linear relationship between GDP level and gender equality. Moreover, Lo¨fstro¨m [42] proposed that higher job openings ratios for women would benefit a nation's GDP, such as Sweden.

The results listed aforementioned, nevertheless, relate to equality for women and job opportunities of women as a whole as indicators of a country's development rather than financial achievement, therefore being the subject of the current research. Furthermore, as was already mentioned, the statistics of many quantitative FDI research contain emerging nations. In contrast, as Pakistan continues to be the country that receives the largest number of direct investments in the modern, globalized world, this paper examines the economic situation of Pakistan as the destination of foreign direct investment.

3. Research Methodology

We incorporate the use of Pakistani internal FDI statistics as well as a number of explicating parameters from the World Bank's World Development Indicators. The information set is available for the years 2002–2022. Net FDI inflows are the examination's dependent variable. The share of primary, intermediate, and university educated workers are the independent variables. The following is the basic framework of the hypothesis that has to be investigated:

$$INFDIct = a0 + akXct + amZct + ui + vct$$

A time-invariant individual-specific effect is called mc, and the stochastic remainder disturbances, which are assumed to be IID (0, s2n), are denoted by *vct.* The FDI recipient country is c, and the time (2002–2022) accounts for the unobservable time-invariant individual-specific effect not included in the regression. The factors of interest, such as gender education and human capital levels, are included in *Xct*, whereas *Zct* measures standard characteristics that are particularly significant to international investors: The GDP of Pakistan's economic system symbolizes the extent of the country's marketplace, in accordance with the theory that markets that are bigger tend to attract larger amounts of investment[44],[45],[46],[47],[48]; (iv) the destination country's accessibility to foreign transactions, which is measured by the number of imports and exports as a share of gross domestic product[49]; (iii) the real interest rate, indicating the expenditure of capital in a country as well as preserving the financial threat brought on by fluctuations in fiscal policy [50].

The rate of inflation in the destination nation, trade facilitation, GDP per capita, and the total number of people in the host nation all of which are the controlling factors for market-seeking foreign direct investment were provided by the World Bank for the years 2002–2022. Following that, these statistics had been employed to construct the 5-year statistics for the host country. During an additional comprehensive review, the inward foreign direct investment statistics from 2002 onward have been retrieved from the World Bank's statistics Extract Service. Table 1 below contains descriptions along with the data sources.

Table 1:
Description and Sources of Data.

Variables	Description	Source
Workforce PE % Total/Female/Male	A percentage of workers having only a primary education, which is the most basic degree of education, is known as the employees with basic schooling.	World Bank
Workforce SE % Total/Female/Male	The percentage of the workforce that finished elementary school, having the greatest degree of education, makes up the employees with secondary school education.	World Bank
Workforce HE % Total/Female/Male	The percentage of the workforce that finished elementary school, with the greater degree of education, makes up the employees with higher education.	World Bank
FDI net in (WB)	Net influx of foreign direct investment	World Bank
FDI (WB)	Total inflows of foreign direct investment,	World Bank
GDP 1000 USD	Gross domestic product / person (in constant 1000 US dollars)	World Bank
Trade Openness	International trade as a percentage of the gross domestic product	World Bank
Real IR%	Rate of Interest in Nominal Terms (%)	World Bank

4. Data Analysis

Researcher pooled the data in order to execute our regression analysis first in our econometric definition. As suitable for interpretations provisional on a specific range of N nations, the fixed effect in the least-squares approach (sometimes called least squares dummy variables) specification was introduced in a subsequent stage. The robust standard error approach was utilized to produce adjusted approximations in order to take into consideration issues brought on by hetero-scedastic residuals, a frequent occurrence when working with macroeconomic variables. Additionally, we used the condition number and the variance inflation factor (VIF) to look for potential multicollinearity issues [51].

The final findings are displayed in Tables 1 through 3, and the values of every variable used in regression analyses using Stata show stability. In terms of likely variability and Hausman tests, either robust or (vec) robust approaches were used; p is often less than 0.05. As a result, we kept using the model with fixed effects rather than the random effect model. The quantity of educated workers (both males and females) plus the controlling variables is represented by the first column in Tables 1 through 3. The regression findings for the two genders are shown individually in the second and third columns.

5. Empirical Results

According to Table 1, the proportion of men in the workforce with just a primary education attracted a higher level of foreign direct investment (FDI) than did the proportion of women in the workforce (5% and 10%, correspondingly, with a constructive indication for both genders). It should be mentioned that because of collinearity, the mean of the VIF test in this sample was 6.95. At the 1% significance level, the amount of FDI was nearly equal when the workforces of men and women were studied independently. The findings show that a 0.11% rise in FDI flows for Pakistan was linked to a 1% increase in the proportion of males or females having a primary education.

Table 2:
Workforce with Primary Education and FDI.

Foreign Direct Investment	Variables	Eliminating female workforce with PE	Eliminating male workforce with PE
Female workforce with PE	0.0* (0.61)		0.11*** (9.77)
Male workforce with PE	0.08** (1.95)	0.11*** (9.56)	
GDP per capita	0.0001*** (10.85)	0.0001*** (10.79)	0.0001*** (10.99)
Trade openness	0.01*** (4.64)	0.01*** (4.81)	0.01*** (4.67)
Real interest rate	0.09*** (3.92)	0.09*** (3.92)	0.09*** (3.94)
R-squared	53.99%	54.05%	55.06%
No. of observations	250	250	250

*Note: *, **, and *** represent significance at 10%, 5%, and 1%, respectively. t statistics are in parentheses Female workforce with primary education = workforce with primary education, female (% of female workforce); Male workforce with primary education = (% of male workforce); GDP per capita (constant US$1000); Trade openness = trade (% of GDP); Real interest rate (% of GDP).*

In terms of secondary education, the outcomes fail to demonstrate the true influence on inward FDI as a result of high collinearity (even with robustness, the mean of the VIF test was 29.46). (Table 2). Nonetheless, the size was nearly equal for the two genders (1% threshold of significance), just as it was for basic schooling. If the number of women in the workforce increased by 1%, FDI increased by 0.09%, whereas the amount of money invested in men increased by 0.11%.

Table 3.
Workforce with Secondary Education and FDI.

Influx of FDI	Variables	Eliminating female workforce with SE	Eliminating male workforce with SE
Female workforce with SE	0.039* (0.66)		0.07*** (9.71)
Male Workforce with SE	0.039* (0.63)	0.08*** (9.76)	
GDP per Capita	0.0001*** (10.68)	0.0001*** (10.82)	0.0001*** (11.66)
Trade Openness	0.01*** (3.34)	0.01*** (3.38)	0.01*** (3.31)
Real Interest Rate	0.09*** (4.54)	0.09*** (4.56)	0.09*** (4.53)
R-squared	53.83%	53.86%	53.87%
No. of Observations	250	250	250

*Note: *, **, and *** represent significance at 10%, 5%, and 1%, respectively. t statistics are in parentheses Female workforce with primary education = workforce with secondary education, female (% of female workforce); Male workforce with secondary education = (% of male workforce); GDP per capita (constant US$1000); Trade Openness = trade (% of GDP); Real interest rate (% of GDP).*

Although each gender underwent evaluation simultaneously, there was indeed a significant disparity in FDI for higher education (Table 3). Inside foreign direct investment was more significantly impacted by men (5%) than by women (10%). The degree of significance did not change for either gender when the genders were examined independently. The combination of regressions used produced a positive sign, and just as in secondary schooling, the influence of men was nearly equal to that of women (standard deviations of 0.14 and 0.13, correspondingly).

Table 4. Workforce with Higher Education and FDI.

Foreign Direct Investment	Variables	Eliminating female workforce with HE	Eliminating male workforce with HE
Female workforce with HE	0.03* (0.76)		0.13*** (10.01)
Male workforce with HE	0.11** (2.08)	0.14*** (4.24)	
GDP per capita	0.41***(11.91)	0.41*** (11.87)	0.42*** (12.09)
Trade openness	0.01*** (5.39)	0.01*** (5.54)	0.01*** (5.28)
Real interest rate	0.07*** (3.43)	0.07*** (3.42)	0.07*** (3.41)
R-squared	56.94%	57.65%	57.17%

No. of observations	250	250	250

*Note: *, **, and *** represent significance at 10%, 5%, and 1%, respectively. t statistics are in parentheses Female workforce with primary education = workforce with higher education, female (% of female workforce); Male workforce with higher education = (% of male workforce); GDP per capita (constant US$1000); Trade openness = trade (% of GDP); Real interest rate (% of GDP).*

One major factor contributing to males' greater relevance than women's is the educational specializations that youthful males and females select. Women tend to prefer careers in medical care, statute, sociological studies, physiological science, the social sciences, artistic endeavors, and teaching. When it comes to a nation's educated workforce and investment success, males, on the other hand, are more interested in disciplines connected to manufacturing, engineering, and construction, as well as computer science and mathematics. However, following robustness, throughout every level of education, the average variation for males and females remained approximately equal, as seen in Tables 1 through 3.

The aforementioned regression analyses show that every control variable was consistently positive and statistically significant at 1%. The workforce with higher education had the greatest GDP per capita coefficients (0.42 and 0.41, respectively, for males and females; see Table 3). Based on all possible combinations considered, these coefficients weakened to 0.001 in the instance of basic and secondary education for both genders (Tables 1 and 2).

In addition to all other variables, openness, as measured by trade as a proportion of GDP, consistently shown a positive link with all educational levels for both genders. Because of the regressions of the elementary and secondary levels, its coefficient stayed constant and in some cases exceeded that of GDP per capita. Similar to the earlier estimates, the proportion of real interest rate was always positive.

The regression analyses' control variables have been widely employed in earlier empirical research and are thought to be significant factors influencing FDI flows. To obtain fresh insights, it could be necessary to include variables different than the conventional ones in a subsequent study.

The outcomes are consistent with the findings of Nunnenkamp and Spatz [29], who assert that having a certainly qualified staff is essential. It may be beneficial to expand our research by adding these nations to the dataset as they were taken into consideration for their sample, which includes so-called transitional economies, in order to get intriguing new findings.

Our results demonstrate a favorable correlation between education and inbound foreign direct investment at all levels of the workforce. On the other hand, FDI is more impacted by higher education than by secondary and basic education. The concluding result is consistent with Shatz's [27] observation that higher educated workers drew greater foreign direct investment. However, unlike this study, Shatz concentrated on education as a factor influencing foreign direct investment, disregarding gender disparities in education. Even though they did not distinguish between male and female participants, the results are likewise in line with those of Nonnemberg and Mendonca [30], who maintain that the degree of labor prerequisite is a critical determinant of inward FDI for the financial development of emerging countries. Nevertheless, as noted in the current analysis, the majority of earlier research used several education-related factors, including the median number of years spent attending education [49], deprived of accounting for the workforce's employment status.

Similar to our research, the majority of earlier empirical investigations focused on developing nations. It would be stimulating to look into the manner in which any distinctions between the two genders could influence FDI within these economies, though, given the results indicating that well-educated and innovative people have a beneficial impact on South Asian the capacity of nations to compete in a global marketplace and, consequently, their likelihood of attracting FDI [52].

6. Conclusions and Further Implications

Examining a nation's ability to draw foreign direct investment (FDI) was the aim of this empirical study. Investment flows into Pakistan are favorably correlated with all levels of education. Nonetheless, it is evident that tertiary education has a significant role in driving inbound foreign direct investment. When the statistics make it possible to estimate in detail the impacts that each of secondary education's sublevels upper and lower secondary/post-secondary have on inbound foreign direct investment, secondary education also appears to be beneficial.

It is often recognized that advanced research programs needing the necessary qualifications are linked with higher education, meanwhile elementary and middle school are largely focused to acquire practical abilities. This suggests that in order to gauge its impact, we need concentrate on various study fields and gather information on particular industries, such as climate change [53], power, and medical treatment.

According to present research, FDI and gender have a good relationship. Nonetheless, the population-wide regression analysis reveals that men with elementary and higher education have a greater effect than women, where the subsequent category's overall threshold for relevance was 5%, whereas ours was only 1%. Compared to earlier decades, women in Pakistan today possess higher levels of education and may provide a variety of talents to the workforce. However, they continue to have lower employment rates, work in lower-paying industries, particularly in outlying areas, and are not included in many stages of economic growth. For instance, in Pakistan overall, males are more likely than women to hold management positions. Less than 17% of senior managers are female in the workforce.

Many other factors might also have a role, like economic expansion, administrative expansion, and rising prices. But given that equality among genders in employment and in academia were our main concerns, we decided to use the most popular ones. However, further study along these lines with the inclusion of additional pull variables in addition as countries throughout the world face new challenges and uncertainties, government initiatives must more effectively address the requirements of all populations. In addition, new trends in schooling, employment efficiency generally, growth possibilities, and employment circumstances have emerged for economies globally as a result of the Covid-19 epidemic. Women's standing in the cutthroat job market is thus become increasingly precarious to human capital may be conducted in the future.

The findings of this study, along with a 2010 study by the Economics Department of Pakistan, recommend that the administration of Pakistan include new components in its governmental regulations, such job flexibility and household taxes. Taxes affect labor rewards generally, but they may also negatively affect married women's employment decisions. In fact, women need to be free to pursue careers as professionals later in life and to work under flexible, short-term employment arrangements without having to worry about money. On the contrary hand, women are better able to balance employment with customary family duties like childcare when they have access to convenient and favorable to family's workplaces, especially those that allow them to work a part-time.

Pakistan must encourage female employment since it is essential to FDI inflows. Even with the recent advancements, women still do not have complete economic freedom. For businesses and

governments, this gender disparity results in decreased performance, creativity, and effectiveness. This holds true for the majority of nations worldwide. Future econometric investigations that go outside South Asia and Asian nations may find it helpful for comparisons. However, the recovery from the financial crisis took longer for some of these economies—like Korea and Indonesia—than for countries where the gender disparity was less pronounced. For this reason, the results of this study should be considered. In order for the Asian economies to integrate and, therefore, for their long-term expansion and advancement, gender equity in the fields of educational attainment and workforce involvement may be considered as a crucial first step.

Competing Interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.
Data Availability Statement: The paper and additional data include the research's distinctive findings; for more information, contact the article's corresponding author(s).
Ethical Issues: Not applicable.
Funding: The research, writing, and/or publishing of this work were all done without financial assistance from the author(s).
Consent to Publish: All authors are agreed to publish version of the manuscript in this journal.

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