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# The Power of Story Telling in Healthcare

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Everyone has a story to tell and even enjoys listening to one, especially if it is engaging and worth listening to. Many of us have childhood memories of convincing our elders to tell stories, some of which have had a lasting impact. This also includes stories from reading good books or watching movies, recalling how overwhelmingly fascinating they were, a drift away from reality. Little did we know that over the years, we would be applying the art of story-telling to our professional lives as well, as health stories influence listeners and readers in ways that statistics never will. Looking back on all the years of my professional education, while learning facts and figures, I had long forgotten the impact of story-telling until I attended a certification course on "Effective Writing for Health Care" at Harvard Medical School last year. It rekindled my love not only for reading but also for narrating and designing stories in my professional field by applying digital storytelling techniques. It left a lasting impression on my mind and incited me not only to write health stories, but also to create them digitally to educate the public regarding health care.

Writing has always been a challenge for health professionals. We seek perfection, whereas writing is all about making mistakes. This might be the reason why we fear writing about our personal experiences as doctors. We fear sounding foolish. Clinicians are good with writing prescriptions or a scientific research paper, and that reflects their authority and seniority. They are trained to meet deadlines and never leave work pending, unlike in writing, which requires a lot of drafting and revising. If we look around, there are abundant stories we can write about, not necessarily for health journals alone, but also for other social media platforms that have a wider audience compared to those who read scientific journals. To evoke empathy, it is more important to write about the condition of the patients rather than their illnesses and at the same time also describe our feelings for them as clinicians. Clinical case scenarios in the form of Problem Based Learning during the academic years of medical training are also a component of story-telling to incite empathy for patients among medical students from the pre-clinical years. As health professionals, we can replan our lessons in a story telling mode to better engage our students.[1]

Today, digital storytelling has emerged as a popular tool in educating the public on health matters as it integrates digital technology with public health. It is predominantly defined as a story in multimedia form, presented as a video or animation for public viewing and used as educational material for healthcare professionals, patients and families.[2] Patient education is becoming increasingly important with the rise in chronic illnesses, and this technique of educating and engaging patients leaves a lasting impression on their minds. The inspirational aspect of digital storytelling is that it works equally well for all viewers, educated or uneducated, as it engages listeners on a whole new level, arousing their emotions and energy. To motivate people to reach certain goals, we must engage their emotions, and the key to their hearts is a compelling story. By applying digital technology, we can better engage and motivate our trainees and transform them into lifelong learners, as storytelling is a catalyst for inspiring not only empathy but also behavioral change, both in education and health care.

The power of storytelling in healthcare is undeniable. Besides inciting empathy and evoking behavioral change, stories narrated verbally, in writing or through digital media can communicate complex medical information, provide psychological support, and strengthen the provider-patient relationship.[3] Real-life examples - such as Dr. Atul Gawande's book "Being mortal: Medicine and what matters in the end"[4]- Dr. Brian Goldman's TED Talk[5]- and the American Heart Association's campaign[6]- highlight the efficacy of storytelling in healthcare. As healthcare continues to evolve, embracing the power of storytelling can lead to improved patient outcomes, enhanced patient experiences, and a more compassionate healthcare system. There is a scientific explanation for why storytelling affects us so powerfully. In an article for the Harvard Business Review, Paul J. Zak, founding director of the Center for Neuroeconomics Studies at Claremont Graduate University, explains the role of the neurochemical oxytocin. It is produced "when we are trusted or shown kindness, and it motivates cooperation with others. It does this by enhancing the sense of

empathy, our ability to experience others' emotions."[7]
There is a vacuum in the field of medical journalism in Pakistan as there is no formal training on writing health stories or creating them by using digital technology, even though we all realize its profound impact on the human brain and its practical application in the field of medicine. We also lag behind in academic writing, without which we can never be good story writers. It is time we apply the art of story-telling to the health sciences to inspire our trainees, viewers, readers and listeners to motivate our patients to fight their ailments. Assuming we are in possession of a functional human brain, we have at our disposal a device that has been shaped by millions of years of evolution to tell and to understand the world through stories. We can't change the human brain, but we can change our frame of mind to let the legacy continue.

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Original Article

# Comparison between Vitamin-D and Urinary Angiotensin Converting Enzyme Levels in Type 2 Diabetic Hypertensive Patients with Non-Diabetic Hypertensive Patients

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## Abstract

**Objective**: To correlate urinary Angiotensin Converting Enzyme–2 (ACE-2) with serum vitamin D levels in Type 2 Diabetic-Hypertensive and non-Diabetic-hypertensive patients.

**Methodology:** The Department of Physiology at the University of Health Sciences in Lahore undertook this observational, correlational study from March 2018 to February 2019. The Services Institute of Medical Services (SIMS), Lahore's medical OPD and diabetic centers were used to select 95 hypertension patients between the ages of 30 and 60 divided into 2 groups. Anthropometric parameters as well as Blood Sugar Random (BSR) and serum Vitamin D were recorded. Urine samples for evaluating angiotensin converting enzyme 2 were collected.

**Results:** Urinary ACE2 showed negative correlation with serum Vitamin D level (r=-0.336, p=0.034) in group A non-diabetic hypertensive patients, but not in group B diabetic hypertensive patients (r=0.07, p=0.677). Despite somewhat greater vitamin D levels in group B, this difference was not statistically significant.

**Conclusion:** There was no link between ACE2 and blood Vitamin D levels in the diabetic hypertensive patients, despite the fact that we hypothesised that vitamin D would be considered as a viable treatment alternative for treating these individuals.

**Keywords:** The Renin Angiotensin System (RAS), Serum vitamin D levels, Angiotensin Converting Enzyme 2(ACE-2), Diabetes Mellitus, Hypertension

## Introduction

Two of the chronic diseases whose prevalence is increasing globally every day are diabetes and hypertension.[1] Diabetes prevalence among persons over the age of 18 has increased globally, from 4.7% in 1980 to 8.5% in 2014.[2] Recently compiled data shows that approximately 150 million people are afflicted by diabetes mellitus worldwide; the number may double by 2025.[3] Majority of the increase in cases will be in the developing countries due to population growth, aging, unhealthy diets, obesity and sedentary lifestyle.[4] Diabetes is a major cause of stroke, limb amputation, blindness, heart attack and renal failure Diabetes is thought to have directly contributed to 1.6 million deaths in 2015 and by 2030, diabetes is predicted to overtake heart disease as the sixth biggest cause of death.[5] While managing blood pressure and maintaining fluid balance, the Renin Angiotensin System (RAS) is crucial. It maintains a balanced pressure and resistance of blood in the small capillaries regulating hypertension. Many diseases including hypertension are caused by RAS activity that is out of equilibrium. Diabetes alone is not the only health concern in Pakistan. There is also a growing concern among the population about the growing number of vitamin D deficiency cases throughout the country. A steep rise in vitamin D deficiency among South Asians has been documented over the past few decades.[6] It has been observed by health experts that vitamin D deficient subjects are prone to develop diabetes mellitus accompanied with hypertension.[7] Many surveys have been conducted in all provinces of Pakistan over the years to find out the prevalence of Diabetes Mellitus in numerous populations and age groups but less research has been done on the concurrent presence of Type 2 Diabetes Mellitus and hypertension in vitamin D deficient patients. In this study, patients from the local Punjabi population who have Type 2 diabetes and hypertension as well as those who have never developed diabetes are examined to better understand and link urine angiotensin 2 a measure of renal tissue activity with serum vitamin D levels.

Renal failure is one of the leading complications of both diabetes mellitus as well as hypertension increasing the burden of morbidity and mortality linked to them. To be able to detect developing renal derangement very early in its evolvement would be revolutionary to curtailing its dreary fate. Urinary ACE 2 could be a marker which helps to reveal early renal damage in its initial stages. We hoped to prove this in our study thereby decreasing the incidence of chronic renal failure.[8] As vitamin D is involved in down-regulating ACE-2, it may play protective role against development of both diabetes mellitus and hypertension. Keeping this in mind, we hoped to find evidence to support this role of vitamin D suggesting its prophylactic use as well as impeding the progression and severity of hypertension and DM.

## Methodology

This observational correlational experimental work was regulated in UHS Physiology depart-

ment, Lahore, within period of approximately 12 months following moral consent by the Institutional Ethical Review Committee. A total of 95 patients were subjected for research work between the age figure of 30-60 years subjected from the life rescue department outdoor patient department and center for diabetic patients of Services Institute of Medicine Sciences (SIMS). There were two groups created from these patients: Group A included non-diabetic hypertensive patients whereas Group B included diabetic hypertensive patients. Group "A" contained 46 patients who were already diagnosed cases hypertensive but not diabetic and Group "B" contained 49 patients who were already diagnosed cases diabetic and hypertension. Each recipient's signed informed consent was obtained before general and systemic analysis was used to eradicate any integral disorders. Sphygmomanometer was used to record the subjects' blood pressure. Asymmetrically blood glucose was observed then and there. Another device with name Enzyme-Linked Immunosorbent Assay (ELISA) kit used to evaluate the urinary ACE margin point. Serum choleciferol levels were evaluated by ELISA kit. (Bio-Rad Laboratories, USA).

### *Statistical Analysis*

The data was examined while using the statistical analytical tool for social sciences (SPSS) version 20. The terms "mean" and "Standard Deviation" refer to normally distributed descriptive variables, whereas median and Inter Quartile ange (IQR) are intended for asymmetrically distributed numerical values. Shapiro-statistical Wilk's tool corrected the data's classification. Student "T" tests and p-value of 0.05 were used to compare group means for quantitative variables with regularly distributed dispersion while Mann Whitney "U" tests were applied to relate group means for quantitative parameters with erratically scattered distributions. The Spearman's "rho" correlation was used to establish the correlation forms among quantitative variables that were thought to be not normally distributed while Pearson correlation (r) was used to find the correlation relationships between variables that were normally distributed. A p-value below 0.05 was typically applied to get statistically meaningful object for all intents.

### Results

According to the Shapiro-Wilk Test information gathered from urine ACE 2 levels was not distributed ethically. The median value for each branch must be found. Non-diabetic, hypertension patients (group A) had a median (IQR) of 26.47 (19.5-34.3) mg/dl, while hypertensive patients' with DM (group B) had a median (IQR) of 22.86 (16-28.2) mg/dl (Figure 1).

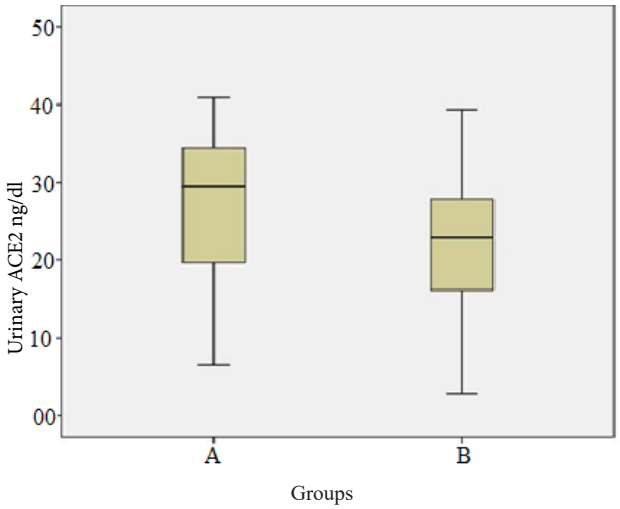


**Figure 1**. Variation in ACE 2 Levels in the Urine was Substantial. Comparison of Group A's and Group B's Mean Urinary ACE 2

Urinary ACE2 showed negative correlation with serum vitamin D level (rho=-0.336, p=0.034) in non-diabetic, hypertensive patients (Figure 2) but not in diabetic hypertensive patients (Table 2).

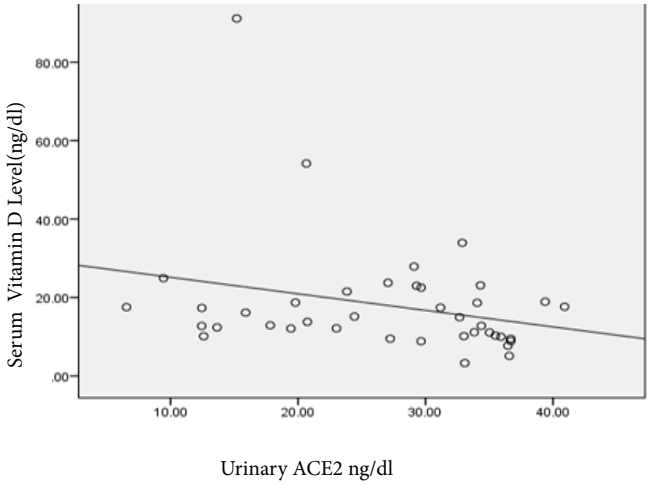


**Figure 2.** Correlation between uACE2 and Vitamin D in Group A.

**Table 1.** Comparison of sVitamin D & uACE2 in the two groups

| Parameters | Group A | Group B | p-value | Distribution |
|---|---|---|---|---|
| sVit.D (ng/dl) | 14.4(10.2-20.9) | 15.8(11.1-23.6) | 0.415[b] | Irregular |
| uACE2 (ng/dl) | 26.5(19.5-34.3) | 22.9(16.0-28.2) | 0.007[b] | Irregular |

Where
"s" represents serum
"u" represents urinary.
p less than 0.05 is significant

**Table 2.** Correlation between urinary ACE2 & serum Vitamin D level in Group A & B

| sVit D | | Group A | Group B |
|---|---|---|---|
| | | sVit D | sVit D |
| Urinary ACE2 | rho | -0.336* | 0.07 |
| | p- value | 0.034 | 0.677 |
| | n | 40 | 38 |

Where rho represents Spearman's correlation coefficient,
"n" represents number of patients.
p less than 0.05 is significant

**Discussion**

Diabetes causes scarring of the kidneys which in turn leads to salt and water retention, raising blood pressure. Numerous studies are being conducted to better understand the pathology of the onset and development of complications associated with diabetes and hypertension as well as their associated morbidity and mortality. These studies also aim to identify predisposing factors and new biochemical markers of complications. Among the list of predisposing factors vitamin D deficiency seems to be the most relevant and relatable factor as majority of our population is vitamin D deficient. Renin Angiotensin System has two opposing lines of action.[9] One of its actions is secreting Angiotensin II with the help of Angiotensin Converting Enzyme (ACE-I). Antagonistic to this action this system also degrades Angiotensin (ACE-II) via Angiotensin Converting Enzyme II.[9] The first action is responsible for elevating blood pressure causing hypertension whereas the second action is responsible for decreasing blood pressure. As Type II Diabetes Mellitus causes loss of Angiotensin Converting Enzyme (ACE-II) in urine, it predisposes to hypertension. Vitamin D enhances ACE-II and thus may prevent hypertension and diabetes mellitus.[10]

Several studies have shown that diabetes inhibits RAS's protective function which hastens the development of hypertension. Insulin resistance which has been linked to RAS and is thought to be major contributor to type 2 diabetes mellitus, it is also one of the causes of hypertension. on the other hand ACE2 overexpression decreases ROS production and identifies it as a novel antioxidant. Hepatic insulin resistance which is believed to be caused by increased angiotensin II levels has been identified as the primary cause of type 2 diabetes mellitus.

As vitamin D impedes renin creation, with time it reduces raised blood pressure.[11] Thus, it acts as a negative endocrine controller of the renin-angiotensin system (RAS).[11] Evidence to this effect was obtained in a large meta-analysis according to which a 25nmol/L upsurge in 25(OH)D concentrations depresses the threat of incident hypertension by 12%.[12] Deletion of vitamin D receptors in mice demonstrated up-regulation of renin mRNA and protein expression in their kidneys. Consequently, they had hypertension and target-organ damage. The influence of vitamin D on RAS is not a secondary effect via calcium and parathyroid hormone rather a direct suppression of the renin gene transcription through 1,25(OH)2D-liganded VDR.[13] In numerous cross-sectional investigations, it has been discovered that markers for the chance of developing diabetes later in life are inversely associated to vitamin D levels. The hypothesis that vitamin D treatment improves glucose homeostasis has also been upheld by a few animal studies. A study carried out on Korean population showed that reduced 25(OH) D serum levels were coupled with insulin resistance.[14] Similar studies on Asian populations demonstrate a correlation of dwindling 25(OH) D levels with high fasting insulin levels and high HOMA-IR scores. 1,25(OH)D-3 contributes to the pathogenesis of both diabetes mellitus and essential hypertension by inhibiting the RAS.[15]
We anticipated a negative connection between urine ACE2 and vitamin D in patients with either one or both of these illnesses given the mounting evidence for vitamin D's preventive function against both hypertension and diabetes mellitus. Although we obtained a significant negative correlation between the two parameters in hypertensive patients without diabetes mellitus, it was not significant in the patients with both hypertension and diabetes mellitus.

This might have occurred as a result of differences in the standard of care and patient management. Individuals for Group A were drawn from the SIMS medical outdoor patient department and emergency department while group B subjects were chosen from the SIMS diabetes center. Unfortunately, we neglected to account for the variations in medical treatment provided by the two departments at the time of sampling. The diabetes center is a very well-run methodical and organized division with excellent patient counseling and education resources and a sound tracking of patients throughout treatment. Although they also accept incoming poorly controlled diabetes patients, the bulk of their patients are trained enough to keep a good control of their blood glucose levels who come in for follow-up consultations. As a result, they do well and typically experience less difficulties than patients who visit SIMS's other departments. The medical OPD/emergency in contrary interacts with a bigger volume of patients but is less regulated and qualified. The majority of patients are illiterate, misinformed and underprivileged people who know very little about their chronic illnesses let alone the treatments they will receive. In comparison to patients visiting the diabetic clinic and subsequent visits compliance is significantly lower. As a result, those who were recruited from this environment typically had worse health than those who came from the diabetes clinic. We were unaware of this restriction when we conducted the tests and the sampling. The only time we became aware of our unintended mistake in patient selection was during the compiling of the facts and retrograde scrutiny.

**Conclusion**

We could prove our hypothesis about correlation between ACE2 levels in urine and serum vitamin D levels in patients with hypertension alone, although we could not do so in patients with both hypertension and diabetes mellitus. Therefore, further research is required to undoubtedly declare vitamin D as a negative controller of the RAS.

**Limitation of Study**

We want to clarify a confounder/limitation of the study at the end of this manuscript. The Services Institute of Medical Sciences (SIMS) located in Lahore, served as the site of the study's sample. Although we made every effort to demographically pair the patients from the two groups, we still found that the patients' quality of care and level of control varied. This was due to the fact that group B subjects were chosen from (SIMS's) diabetic center, having patients trained enough to keep a good control of their blood glucose levels who come in for follow-up consultations, as opposed to group A subjects who were chosen from SIMS's medical OPD and emergency, less organized and less equipped and deal with a higher volume of diabetic patients. Regrettably, we did not account for this difference in medical care at the onset of this study. The only time we noticed the difference in our unintended selection criteria of both groups in patient selection was during the compilation of the findings and retrograde analysis. Pragmatically, we would have chosen patients who were un-medicated diabetics and attending the clinics for the first time.

**Authors' contribution:** MJS wrote the manuscript and literature review, SN contribute in literature review and statistical analysis; SM helped in data collection and compilation

**Conflict of interest:** All co-authors have seen and agree with the contents of the manuscript and there is no conflict of interest to report.

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Original Article

# Depression and Suicide Attempt during Dementia, and their Clinical Correlation in Elderly Indian Population from LASI Wave I (2017-2018)

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## Abstract

**Objective:** Adult people are more prone to developing physical organ-related or mental disorders due to deterioration of body functions. Dementia is one such condition that prevails among older patients. This survey collates the effects of various demographic characteristics on depression and suicidal tendencies among the adult population with dementia across India. **Methodology:** This was a cross-sectional online survey that included 402 elderly patients (45 years and above) with dementia from different states of India conducted between June 2017 to June 2018. Depression and suicidal tendencies were dichotomized as No-"0" and Yes-"1'. Other explored variables in respect to depression and suicidal tendencies among patients with dementia were age, gender, area of living, wealth index, education, caste, religion, marital status, living arrangement, social security. **Results:** Age, gender and place of living had a significant effect on developing depression among adults with dementia (P<0.05). Factors such as education, wealth index, caste, religion, marital status, living alone or not and the presence or absence of social security didn't have a significant effect on depression amongst people with dementia (p>0.05). In case of emerging suicidal tendencies among patients with dementia all the mentioned categories didn't show significant changes. **Conclusion:** The patients with dementia had a greater inclination towards developing suicidal tendencies. Suicidal tendencies didn't change significantly with age, gender, education, wealth, caste, social security, place of living, living arrangements, and marital status. Depression showed significant effect in terms of gender i.e. female and rural areas. Other socioeconomic characteristics didn't establish significant effect on developing depressive symptoms and dementia.

**Keywords:** Dementia, Depression, Longitudina Ageing Study in India, Suicidal tendencies, Socioeconomic characteristics.

## Introduction

Globally, more than 600 million people are estimated to fall in the age category of 60 years and older. This number is predicted to get doubled by 2025 to 2 billion as per World Health Organization.[1] As age progresses health condition of elderly people deteriorates both physically and mentally. They are more prone to body injuries, metabolic, cardiovascular disorders and other physical illnesses. Neurological disorders impair the Judgment abilities, language deficits and cognitive capacity. These factors add to already slowing down or impaired mental conditions that lead to damaged mental health.[2] It has been found that suicidal tendencies/suicide is one acute problem found in above the age of 60 adults. As of the result these disorders such as anxiety, insomnia, Alzheimer's, depression and vascular dementia are commonly seen.[3] The most common mental disorders found in these population is dementia, mood and anxiety disorders and amongst these cognitive impairment is the most common symptom. A positive correlation exists between the rise in patients with the most common mental disorders such as bipolar disorder, anxiety, and dementia. In addition to depression causes an in increase in the prevalence of suicide in the older adults.[3]

As of the definition, it is known that the syndrome of dementia is mainly categorized as changes in behavior followed by gradual progression of cognitive capacity. These changes are accelerated than normal biological ageing. It is a collative term generally used for various diseases presenting with dementia, such as levy body dementia, Alzheimer's disease, frontotemporal dementia, vascular dementia are categorized by behavioral changes followed by gradual decline of cognitive abilities or vice versa.[4,5] Evidence reported that approximately 50% of all dementia cases are developed as a consequence of Alzheimer's disease.[6,7] The common symptoms observed in patients with dementia depicts progressive behavioral changes, thinking and cognitive abilities worsen over time.[8]

India is currently undergoing swift demographic aging. Careful medical history is an essential component to deal with mental health issues. Having comorbidities in itself builds up a challenging health concern for old age group and when the health system is already overburdened with increasing population, mental health is easily neglected. Underlying past history plays essential role in identifying prevalence of suicide risk factors in elderly population. Thus num-

ber of people with dementia and other later life mental health problems is estimated to rise manifold in upcoming years.[9] The prevalence of depression is poorly understood with dementia among the elderly population. Most of the literature studied are confined to a limited and only certain geographical area. Elderly and older adults having dementia and depression have more than one risk factor for developing suicidal tendencies. It can be beneficial in designing and developing future treatments and prevention measures. Different risk factors have variable effect on depression and suicidal tendencies in adults with dementia. Demographic factors that are explored to check its relation to depression and suicidal tendencies in adults with dementia are gender, education, money, caste, religion, marital status, living arrangements, and social security. It is the need to recognize these risk factors and understand their relationship, particularly in the Indian context where literacy level is still at an alarming level. Hence thorough research and dissemination of research is required for further development of measures to prevent further progression of dementia among adults. Current study is carried out with the objective to find the prevalence of depression and suicide attempts during dementia and their clinical correlation among elderly of India. Furthermore, it is also an attempt to understand the adjusted effect of related co-factors contributing to developing such tendencies.

**Methodology**

This was a cross-sectional online survey that included 402 patients with dementia from different states of India, conducted during the time period of June 2017 to June 2018.

***Sources of Data***

The Longitudinal Ageing Study in India (LASI) Wave 1 (2017–18) (IIPS, 2020)10 provided the data for this study. LASI is a comprehensive national scientific inquiry into the causes, effects, and factors of aging populations in India. A total of 402 subjects was a representative sample of more than 72,000 persons 45 years and older. This total 402 subjects were calculated statistically with help of STATA software. To determine the final observed units, the survey used a multi-stage sampling technique mixed with probability cluster sampling design. Three-stage and four-stage sampling designs were used for rural and urban regions. The selection of Primary Sample Units (PSUs) -from sub districts (Tehsils/Talukas) was the foremost step in selected states. Later steps were taken for the chosen PSUs which had the selected villages from rural areas and wards of urban areas. Third step included the selection of households from the particular villages in rural areas. There was an additional step included in the sampling in urban areas after third step, which was the selection of one Census Enumeration Block (CEB). Random selection was done in urban area which was followed by the fourth step where households were nominated from the chosen CEB. The survey report includes a full explanation of the methodology along with information on the research structure and data collection. The 45-year-old and beyond eligible participants were the main focus of the current investigation. 405 elderly people made up the entire sample size for this study. In-depth information from the first national wave of the LASI on aging, their supportive social relationships, familial structures, and subjective wellbeing would be useful in figuring out the adults' particular needs, conditions, and problems in the context of changing societal circumstances.

***Outcome Measures***

The study's two outcome variables "Depression" and "Suicide" were dichotomized for the analyses. Depression was dichotomized as No-"0" and Yes-"1". The question for identifying depressed individuals "during the last 12 months, was there ever a time when you felt sad, blue, or depressed for two weeks or more in a row. Suicide was also dichotomized as No-"1" and Yes-"0". The question for identifying suicidal tendencies or thoughts was "did you think a lot about death either your own, someone else's or death in general during those two weeks".

Two weeks were referred to as the time when the respondent was feeling uninterested, sad, depressed, of no use, of no good, tired, drained out of energy, trouble concentrating than usual times for at least two weeks in last one year.

***Explanatory Variables***

The explanatory variables for the study were;

Age of the individual was coded across three groups 45-54 years 55-69 years and 70 plus older adults. Gender was coded as male and female. Place of residence was coded as rural and urban. Education was recoded as no education, up to primary, up to secondary and senior secondary and above. Wealth index was coded as poor, middle and rich. Caste was coded as ST-scheduled caste, SC-scheduled tribe, OBC-other backward castes and others. Religion was recoded as Hindu, Muslim and Others. Marital status was recoded as currently married and not currently married. Living arrangements was recoded as Alone and others social security was recoded as 'yes' for having any sort of social security available to the adults and 'no' for none available.

***Statistical Analyses***

Descriptive statistics along with cross-tabulation were presented in the current study. Significance and association were checked using Chi-square test. Additionally, binary logistic regression analyses were done to establish association between the outcome variables and explanatory variables.[11] Binary logistic regression model is usually put into a compact form as follows;

$$\text{Logit}[P(Y=1)]=\beta 0+\beta^{*}X\text{Logit}[P(Y=1)] =\beta 0+\beta^{*}X$$

Parameters β0, β estimate log odds of suicidal tendencies for the reference group, where β estimates maximum likelihood, the differential log odds of suicidal tendencies associated with a set of predictors X, as compared to the reference group. The entire analysis was carried out on the individuals who were suffering from dementia. Software used for the whole statistical analyses was STATA version 16.

**Results**

Out of 402 adults with dementia who took part in this study, reported prevalence of depression was significantly higher in patients (53.3%) in the age group 55-69 as compared to age group 45-54 (50.8%) and 70 plus (39.8%) population (Table 1), while suicidal tendencies were highest in the patients above the age of 70 (76.9%) as compared to other two age groups (55.2% and 54.7%) (Table 2). Logistic regression analysis estimated 27.1% more odds (OR: 1.27 (CI 0.239, 6.75)) for suicidal tendencies for 70 plus age group as compared to 45-54 years age group (p>0.05) (Table 3). Male patients (64.6%) with dementia had shown greater suicidal thinking while female counterparts (57.6%) experienced to be most prone to depression. Women were more likely to exhibit suicidal tendencies than men, when they had dementia [OR: 1.095 CI: 0.288, 4.166].

People residing in rural areas (48.3%) were more depressed patients as compared to urban elderly (42.4%). Depression along with suicidal tendencies were higher in rural part (48.3% vs 42.4% and 62.5% vs 40.4% respectively). Depression amongst adults suffering from dementia was found to be significantly greater in rural geographical areas (p=0.031). The odds ratio for having suicidal tendencies was lower among urban population (OR:0.579 (CI: 0.166, 2.015), p>0.05). Also, patients with dementia whose educational qualification was above senior-secondary level (86.2%) and up-to-secondary level (64.8%) were found to be more prone to have suicidal thoughts (p=0.198) and depression. However, there was no significant change in prevalence of suicidal tendencies and depression among adults with respect to various educational categories (p=0.303 and 0.958 respectively) as shown in Table 1. Education wise, up to secondary level, followed by up to primary level, and senior secondary education level have odds ratio of developing suicidal tendencies of 2.516, 2.113 and 1.046 respectively. Wealth index wise, rich elderly with dementia had highest prevalence of depression (56.7%). While, middle class depressed elderly reported maximum prevalence of suicidal tendencies (75.8%) as shown in Table 3.

Both middle and rich elderly had higher odds ratio of developing suicidal thoughts than poor elderly (OR: 2.147 and 2.29 respectively). No sub-group amongst ST, SC, OBC and others established any statistical significance with regard to depression and suicidal tendencies. Individuals with dementia from castes other than ST, SC and OBC reported to be having higher suicidal tendencies (66.6%). When depression and suicidal tendencies were studied on the basis of religion, muslim people had higher odds of developing suicidal tendencies [OR: 3.088, CI: 0.424,22.50]. The depression and suicide didn't have significant relation with patients' religion.

Loneliness tends to provoke suicidal tendencies. Unmarried patients with dementia were prone to developing suicidal thoughts while married adults with dementia were highly inclined to having depression. Currently married people have lesser chances of developing suicidal thoughts [OR: 0.304 CI: 0.0559,1.656]. Patients with dementia and living arrangements other than alone had higher likeliness of developing suicidal tendencies [OR:4.43 CI: 0.245,80.15]. However vice versa was seen in case of depression. Elderly with dementia have higher prevalence of developing depressive symptoms when living alone. Similarly, patients with dementia who had social security were suffering from depression more than those without social security. On the contrary, patients with dementia who had social security were prone to suicidal tendencies more than who were without social security [OR: 0.747 CI: 0.168, 3.321]. Suicidal tendencies were highest among patients with dementia [OR: 1.14 (CI: 0.350, 3.711)] (Table 3).

**Table 1**. Mean values of Prevalence of depression amongst adults suffering from dementia in India, LASI (2017-18).

| **Basic Information** | **Depression (Feeling sad, blue, or depressed for two weeks or more in a row) n=402** | |
|---|---|---|
| Background characteristics | Prevalence* (95% CI) | Chi square<br>P value |
| Age group | | |
| 45-54 years | 50.8 (40.6-61) | 6.7128<br>p = 0.035 |
| 55-69 years | 53.3 (44.62-61.9) | |
| 70 plus | 39.8 (29.83-49.7) | |
| Gender | | |
| Female | 57.1 (48.63-65.57) | 0.0000<br>p = 0.998 |
| Male | 41.6 (34.8-48.37) | |
| Place of Residence | | |
| Rural | 48.3 (41.57-54.95) | 4.6675<br>p= 0.031 |
| Urban | 42.4 (33.57-51.32) | |
| Education | | |
| No education | 53.9 (37.77-70.13) | 3.6433<br>p = 0.303 |
| Up-to Primary | 43.9 (29.71-58) | |
| Up-to Secondary | 64.8 (52.04-77.48) | |
| Senior-secondary and above | 55.8 (33.84-77.7) | |
| Wealth Index | | |
| Poor | 44.4 (35.29-53.44) | 2.7150<br>p = 0.257 |
| Middle | 34 (22.14-45.81) | |
| Rich | 56.7 (48.9-64.46) | |
| Caste | | |
| SC | 42.2 (30.04-54.32) | 1.2284<br>p= 0.746 |
| ST | 52.8 (35.45-70.17) | |
| OBC | 49.6 (41.39-57.78) | |
| Others | 52.8 (41.84-63.67) | |
| Religion | | |
| Hindu | 46 (39.87-52.1) | 1.1495<br>p = 0.563 |
| Muslim | 54 (37.63-70.31) | |
| Others | 47.6 (32.45-62.77) | |
| Marital Status | | |

| | | |
|---|---|---|
| Currently Married | 50 (43.41-56.67) | 0.022 p = 0.88 |
| Not Currently Married | 42.4 (33.33-51.38) | |
| Living Arrangements | | |
| Alone | 26.8 (2.63-50.96) | 0.053 p = 0.81 |
| Others | 48.2 (42.7-53.64) | |
| Social Security | | |
| Yes | 50.8 (43.85-57.71) | 0.0785 p = 0.77 |

*All the prevalence values are reported in percentage. ST-scheduled caste, SC-scheduled tribe, OBC-other backward castes.

**Table 2.** Mean values of prevalence of suicidal tendencies among adults suffering from dementia in India, LASI (2017-18).

| **Basic Information** | **Suicidal tendencies (Thinking a lot about death at least for two weeks in last one year)** | |
|---|---|---|
| Background characteristics | Prevalence* (95% CI) | Chi square |
| Age group | | |
| 45-54 years | 55.2 (34.04-76.34) | 0.4251 p = 0.809 |
| 55-69 years | 54.7 (36.6-72.86) | |
| 70 plus | 76.9 (55.2-98.61) | |
| Gender | | |
| Female | 53.6 (36.28-70.89) | 0.0883 p = 0.766 |
| Male | 64.6 (49.08-80.02) | |
| Place of Residence | | |
| Rural | 62.5 (49.52-75.55) | 1.6591 p = 0.198 |
| Urban | 40.4 (15.95-64.87) | |
| Education | | |
| No education | 55.4 (21.72-89) | 0.3086 p = 0.958 |
| Up-to Primary | 67.8 (31.9-103.62) | |
| Up-to Secondary | 49.2 (22.07-76.32) | |
| Senior-secondary and above | 86.2 (36.79-135.69) | |
| Wealth Index | | |
| Poor | 51.1 (30.76-71.44) | 1.7894 p = 0.409 |
| Middle | 75.8 (47.36-104.27) | |
| Rich | 61.6 (45.61-77.5) | |
| Caste | | |
| SC | 51.9 (21.88-81.99) | 2.5527 p = 0.466 |
| ST | 17.8 (-26.26-61.76) | |
| OBC | 48.4 (28.42-68.3) | |
| Others | 66.6 (48.48-84.7) | |
| Religion | | |
| Hindu | 63 (49.41-76.63) | 3.2528 p = 0.197 |
| Muslim | 52 (21.97-82.03) | |
| Others | 44.1 (11.11-77.1) | |
| Marital Status | | |
| Currently Married | 51.2 (36.13-66.17) | 0.6426 p = 0.423 |
| Not Currently Married | 72.3 (55.09-89.44) | |
| Living Arrangements | | |
| Alone | 87 (53.58-120.52) | 0.0587 p= 0.809 |
| Others | 57.6 (45.58-69.65) | |
| Social Security | | |
| Yes | 62.8 (48.18-77.4) | 0.1019 p = 0.750 |
| No | 33 (1.59-64.45) | |

*All the prevalence values are reported in percentage.

**Table 3**. Results of logistic regression of suicidal tendencies on various independent background characteristics (LASI 2017-18).

| **Background characteristics** | **Odds Ratio (mean)** | **CI (mean)** |
|---|---|---|
| Age group | | |
| 45-54 years | Missing Data | Missing Data |
| 55-69 years | 0.634 | [0.205,1.965] |
| 70 plus | 1.271 | [0.239,6.753] |
| Gender | | |
| Male | Missing Data | Missing Data |
| Female | 1.095 | [0.288,4.166] |
| Place of Residence | | |
| Rural | Missing Data | Missing Data |
| Urban | 0.579 | [0.166,2.015] |
| Religion | | |
| Hindu | | |
| Muslim | 3.088 | [0.424,22.50] |
| Others | 0.821 | [0.164,4.120] |
| Caste | | |
| SC | Missing Data | Missing Data |
| ST | 2.743 | [0.198,37.91] |
| OBC | 1.549 | [0.249,9.627] |
| Others | 2.652 | [0.398,17.67] |
| Wealth Index | | |
| Poor | Missing Data | Missing Data |
| Middle | 2.147 | [0.511,9.021] |
| Rich | 2.290 | [0.688,7.626] |
| Education | | |
| No education | Missing Data | Missing Data |

| | | |
|---|---|---|
| Up-to Primary | 2.113 | [0.513,8.696] |
| Up-to Secondary | 2.516 | [0.658,9.625] |
| Senior-secondary and above | 1.046 | [0.169,6.490] |
| Marital Status | | |
| Not Currently Married | Missing Data | Missing Data |
| Currently Married | 0.304 | [0.0559,1.656] |
| Living Arrangements | | |
| Alone | Missing Data | Missing Data |
| Others | 4.433 | [0.245,80.15] |
| Social Security | | |
| Not Currently Married | Missing Data | Missing Data |
| Yes | 0.747 | [0.168,3.321] |
| Dementia | | |
| No | Missing Data | Missing Data |
| Yes | 1.14 | [0.350,3.711] |

Exponentiated coefficients; 95% confidence interval in brackets,
* p<0.05, ** p<0.01, *** p<0.001.

**Discussion**

The present study attempted at exploring clinical correlation of depression and suicidal attempt among elderly suffering from dementia. It is observed that elderly with dementia is more prone to developing depression.[12,13,14,15,16,17] This study reinforces this evidence as similar pattern of findings were estimated. There have been scarce data on depression and dementia especially in lower economy and developing countries.[18,19,20] Ferri et al. found 43.8% of the persons with dementia in lower economy had depressive symptoms[18]. Gunak et al. in their study also discussed that the risk of suicide attempts was much higher in patients who were recently diagnosed with dementia[21] and the current study corroborates these findings. In a cross-sectional study carried out by Andresen and others on a population of 1612 persons with dementia, they reported depression prevalence of 12.4%. Further they found 18.9% for men and 10.1% for women were suffering from dementia[22]. In current study, 57.1% and 41.6% men and women with dementia respectively had chances of developing depression. Suicidal tendencies were highest in the patients above the age of 70. Male patients had shown greater suicidal tendencies. The prevalence of suicidal tendencies was higher in the rural populations than the urban Table 3. Also, patients whose educational qualification was above secondary were found to be more prone to have these kinds of thoughts. Middle-class people with dementia and unmarried patients were prone to developing suicidal tendencies Table 3. It is vividly established that dementia tends to provoke suicidal tendencies.

A systemic review carried out by Lawrence et al. reported that though religion is supposed to play a protective part against suicide, the empirical evidence is contradictory. Some studies claimed the effect of religion is positive while few considered it as risk factor and some studies made a neutral stance.[23] Very few studies claimed a positive relation of religion, whereas in current study no such significant association in developing suicidal tendencies and depression was observed among patients with dementia. Studies reported that 5% of people asking for help in tertiary care or general hospital were found to be older than 60 years.[8] In this study, patients with dementia aged 55-65 were found to have a higher incidence of depression, and those aged 70 and older had higher prevalence of suicidal tendencies. It was observed in the United States that loneliness and social isolation in older adults are critical health issues leading to increasing the risk of dementia.[24] A study reported that marital status and living situation reported increased risk of suicides in people without a partner or who lived alone, but the same is not found in patients with a partner or who are living with others.[25] However, in this study, social support such as living circumstances (alone or with someone) and marital status, did not have significant effect on people with dementia on developing depression (p=0.881 and 0.818 respectively) as shown in Table 2,3.

Cadar et al. reported that dementia incidence and level of education didn't have a significant association while wealth was strongly related. The hazard ratio measured for developing dementia was observed higher in the lowest 2 quintiles of wealth (Quintile 4: HR, 1.39; 95% CI, 1.00-1.95 and Quintile 5: HR, 1.50; 95% CI, 1.05-2.13; P for trend =0.04) when compared to the highest quintile (Q1), independent to additional covariates such as level of socioeconomic factors and educational factors.[26] In current study, the education level and wealth status both didn't have a significant association with depression and suicidal tendencies among elderly with dementia (p: 0.95, 0.40 and 0.303, 0.25 respectively) while the odds ratio was higher in middle and rich wealth index elderly with dementia. As per the American physiological association, the management of depression for all the adult age group patients should be a combination of psychotherapy and pharmacotherapy.[27]

**Conclusion**

The patients with dementia were found to be more prone to developing suicidal tendencies. Suicidal tendencies didn't change significantly with age, gender, education, wealth, caste, social security, place of living, living arrangements, and marital status. Depression is found to be higher among females and in rural areas of the states selected. Other socioeconomic characteristics didn't have significant association with developing depressive symptoms and suicidal tendencies.

**Recommendations**

The mental health treatment of elderly should be an amalgam of both the interventions psychotherapy and pharmacotherapy; hence, such an approach would also help in ad-

dressing this major issue needed to help the elderly. Small awareness groups on risk of suicide in old age population should be conducted along with initiatives for preventing old age abuse should be taken by community health workers. More studies with larger population should be carried out to understand the demographic dynamics of dementia, depression, and suicidal tendencies.

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Original Article

# Evaluation of the Impact of Audio-Visual Aids in Reducing Dental Patient Fear in Pakistan

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## Abstract

**Objective:** To assess the use of employing visual information to alleviate dental anxiety in individuals undergoing tooth extraction under local Anesthesia.
**Methodology:** An experimental study was done in three dental institutes of Lahore, University Dental Hospital, Sharif Medical and Dental College and Azra Naheed Dental College. This included a sample size of 80 patients who were divided into two groups of 40 each. The first group was the control group which received verbal information before the extraction of teeth under local anesthesia. The second group was the study group and was shown a video clip containing information about the procedure and non-probability consecutive sampling was carried out. Statistical analyses were performed by using SPSS version 25.
**Results:** Pre-operative anxiety scores in both the groups undergoing extractions revealed the patients were relatively anxious before undergoing dental extraction. A pre-operative comparison drawn between the groups showed the data to be statistically insignificant (p-value=0.222). Verbal communication and the use of audio-visual aid for Group 2 resulted in a decrease in anxiety scores. Group 1 showed a mean anxiety score of 5.4 whereas Group 2 showed 28% reduction in anxiety with a mean of 4.6. The data was found to be statistically significant (p-value<0.001). Similarly a postoperative comparison between the two groups revealed drastic decrease in dental distress and anxiety score for the patients in Group 2 with p<0.001 with the results being statistically significant. Pre-operative and post-operative paired sample statistics of these groups showed 55% reduction postoperatively in Group 2 as compared to Group 1 which showed only 27% reduction in anxiety levels.
**Conclusion:** By showing a tooth extraction video to patients before surgery dentists can reduce the dental anxiety and panic associated with local anesthetic dental extractions.

**Keywords:** Anxiety, Local, Anesthetics, Dental aids, Patients

### Introduction

Anxiety is a multi-system response to an assumed threat or danger. Anxiety can be baseless or rooted in an actual circumstance that causes a stronger response than is often anticipated.[1] Dental anxiety builds up over time and is impacted by a variety of variables. Dental anxiety is a global public health problem spread around the world. It is estimated that about 3-16% of adults suffer from dental phobia.[2] For general dentists treating nervous patients, dental anxiety can be a significant cause of stress.[3] Research has suggested a strong link between avoidance of dental treatment and dental anxiety.[4,5] This fear makes it difficult to receive dental care in the dental chair in a simple and safe manner. For this reason, dental practitioners have tried using different modalities to reduce dental fear and anxiety in their patients. Various noninvasive techniques can be used for the reduction of anxiety in patients. These include creating a pleasant environment, rapport building and a calm atmosphere in the dental office.[6] Pharmacological intervention to decrease anxiety levels in patients advocates the use of nitrous oxide used in conscious sedation along with the use of opioids, benzodiazepines and barbiturates. In some clinical scenarios adult patients require general anesthesia as a means to cope with their dental anxiety.[7] Nonetheless, the use of general anesthesia is associated with potential post-operative complications, including sore throat, bleeding, fever, psychological changes, weakness, sleepiness, nausea, and, vomiting.[8] Tell show do, one of the oldest, simplest, and most reliable techniques are also used as part of anxiety reduction protocol.[9] Modeling is a psychologically-based strategy that enables individuals to learn about their surroundings by watching the behavior of other people utilizing a model either live or recorded. Video modeling is a powerful tool for behavior change. With the advancements in technology a relatively newer technique known as video modeling can now be used in patients to be treated in the dental office. This requires the use of audio-visual aids and video clips that have shown to be of greater benefit while treating pediatric patients but can be used in all patients routinely as well. A study in Saudi Arabia demonstrated a significant decrease in the average anxiety score among patients who viewed a video of the tooth extraction procedure compared to those who received a verbal explanation of the same procedure after the extraction was completed.[10] Despite all these various interventions to manage dental anxiety, such as sedatives, relaxation techniques and communication skills, it still remains a significant problem. Therefore, there is a need to explore and evaluate the effectiveness audio-visual aids in reducing dental anxiety.

There is limited research available on the use of audio-visual aids in the population of Pakistan. The study aims to fill this research gap by providing evidence-based recommendations for the use of audio-visual aids in dental anxiety management in Pakistan.

**Methodology**

The experimental study was carried out at the Department of Oral and Maxillofacial Surgery of University Dental Hospital affiliated with University of Lahore, Sharif Medical and Dental College, and Azra Naheed Dental College. The study was approved by the Ethical Review Board and an ethical letter was obtained from the ethical committee (Ref: ANDC/RAC/114/26/22). The study included patients visiting the oral and maxillofacial department for tooth extraction from January 2022 to April 2022. The patients underwent a thorough screening process, which included thorough review of their medical and dental history, a physical examination of the oral cavity and any necessary radiographic imaging. Most teeth were extracted due to periodontal disease, orthodontic reasons, grossly carious teeth or tooth decay accompanied by a dental abscess. The inclusion criteria inlcluded patients between the ages of 17 and 60 Simple extraction of less than or equal to two teeth patients who were able to understand and cooperate with the protocol's conditions and were willing to provide proper informed consent in writing, patients who reported to the department with mobile teeth requiring extractions of multiple teeth or for third molar/surgical extractions having a language barrier were excluded from the study. A total of 80 patients were divided into two groups, each group comprising 40 patients. Group 1 was the control group in which verbal information was given to these patients before extraction of teeth under local anesthesia. Group 2 was the experimental group in which a video clip containing information regarding the procedure was shown to the patients. The recorded video showed dental surgeon who cordially welcomed the patient took informed consent from the patient, explained the dental injection and tooth extraction procedure and encouraged them to take deep breaths while administering local anesthesia. The patient was urged to indicate by raising their hand if they felt any discomfort during the process so that more local anesthesia could be administered to ease the discomfort. The dentist extracted the tooth painlessly and gave post extraction instructions to the patient. Based on this anxiety scores were assessed pre-operatively, following verbal information or showing video, and post-operatively. The patients' anxiety levels were recorded on conventional 10 mm visual analogue scales (VAS), which were labeled at the endpoints with "no anxiety" (0 mm) and "severe anxiety" (10 mm) (Figure 1). Each patient was evaluated at three stages: preoperatively, after verbal information or recorded video, and postoperatively.

Selected operators were trained on the same criteria to carry out the procedure. The method of extraction was the same in all cases, performed under local anesthesia. Extraction was made as painless as possible. All patients were given post-extraction guidelines after the procedure and were prescribed appropriate drugs.

The sample size was calculated using Cochrane's equation.

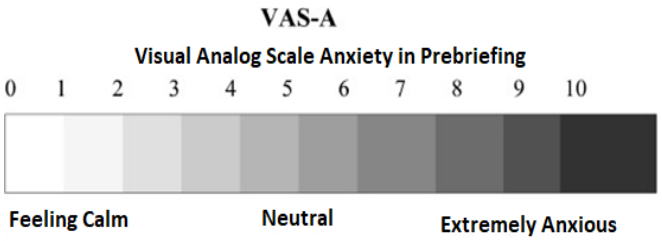


**Figure 1.** Visual Analog Scale

Statistical analyses was performed using the Statistical Package for Social Sciences (IBM®SPSS ®Statistics) Version 25. Descriptive analysis was presented in the form of mean, percentage and frequency. Independent and paired sample T-tests were performed to compare the results of control and experimental groups. A p-value of less than 0.001 was considered significant.

**Results**

The mean age of Group 1 was 35.8 years, while the mean age of Group 2 was greater at 38.4 years. In terms of gender, Group 1 had 18 participants who were male (54.5%) and 22 participants who were female (46.8%), while Group 2 had 15 participants who were male (45.5%) and 25 participants who were female (53.2%). With 33 participants (55%) in Group 1 and 27 participants (35%) in Group 2, the majority of participants in both categories had one tooth involved. Two teeth were implicated in the remaining participants in Group 1 (45%), while 13 people (65%) in Group 2 had two teeth involved (Table-1). Pre-operative anxiety scores in both the groups undergoing extractions revealed the patients were relatively anxious before undergoing dental extraction. The mean dental fear and anxiety scores (6.1 for Group 1 and 6.4 for group 2) did not significantly differ from one another prior to surgery (Table 2) A pre-operative comparison drawn between the groups showed the data to be statistically insignificant (p-value=0.222). Verbal communication and the use of audiovisual aid for Group 2 resulted in a decrease in anxiety score (Table 2). Group 1 showed a mean anxiety score of 5.4 whereas group 2 showed a 28% reduction in anxiety with a mean being 4.6. The data was found to be statistically significant (p-value<0.001) (Table 3). Similarly, a postoperative comparison drawn between the two groups also revealed a drastic decrease in dental distress and anxiety score for the patients in Group 2 with a mean anxiety score of 4.5, and the p-value showing a 55% reduction postoperatively as compared to group 1 which showed only 27% reduction in anxiety levels postoperatively and a mean anxiety score of 2.9. (Table 4)

**Table 1.** Patient Characteristics

| Demographic | | Group 1 | Group 2 |
|---|---|---|---|
| Age | Mean | 35.78 | 38.45 |
| | Age | 17-60 | 17-60 |
| | | n (%) | n (%) |
| Gender | Male | 18 (54.5%) | 15 (45.5) |
| | Female | 22 (46.8%) | 25 (53.2%) |
| Teeth | 1 | 33 (55%) | 27 (35%) |
| | 2 | 7 (45%) | 13 (65%) |

**Table 2.** Pre-operative Comparison of Anxiety Score between Groups

| Group | n | Mean | SD-Value | P-Value |
|---|---|---|---|---|
| 1 | 40 | 6.1250 | 1.01748 | 0.222 |
| 2 | 40 | 6.4000 | 0.968169 | |

**Table 3**. Comparison of Anxiety Score after Verbal/Audio

Visual Explanation

| Group | n | Mean | SD-Value | P-Value |
|---|---|---|---|---|
| 1 | 40 | 5.4000 | 0.84124 | <0.001 |
| 2 | 40 | 4.6000 | 1.05733 | |

**Table 4.** Post-operative Comparison of Anxiety Score between Groups

| Group | n | Mean | SD-Value | P-Value |
|---|---|---|---|---|
| 1 | 40 | 4.5250 | 0.90547 | <0.001 |
| 2 | 40 | 2.9520 | 1.04728 | |

## Discussion

Dental anxiety affects not only the patients but also the dentists in general. Dentists acknowledge that treating worried patients is a substantial source of concern. Many studies have been conducted around the world to evaluate the use of audio-visual assistance in the alleviation of dental fear and anxiety. In Taibah University College of Dentistry. A study conducted by Ghazal et al. showed a 28% reduction in anxiety in patients given verbal instructions and 48% anxiety reduction among the patients who were given audio-visual information before the start of the procedure. This study was like ours in the respect that evaluation method used for anxiety was the same.[11] Another study conducted in Peshawar by Karim et al. using verbal communication as a form of anxiety reduction protocol showed a 15% decrease in anxiety.[12] This finding is similar to the one in our study which showed that verbal counseling alone resulted in a 33% decrease in anxiety in patients prior to dental extractions under local anesthesia. Daoker et al. conducted a study on the effect of audio-visual aid on anxiety levels of patients during the first appointment concluding that audio-visual system is beneficial for reducing anxiety for adults and children undergoing dental procedures.[13] Similar to this, a study conducted in India by Dhanraj et al. El concluded that audiovisual aid is an effective tool for reducing anxiety in patients before starting dental treatment.[14] It is also worth noting here that the use of audiovisual aids in the reduction of dental anxiety serves as an effective means of management in patients of all ages. The reason for this may be because different individuals conceive information differently depending on their learning capacity. Some learn and understand better through text some through audio/visual aids some through active participation.[15]

## Limitations

This study has a few limitations. Our research included only 80 participants, which was insufficient to draw definitive conclusions about the efficacy of using visual aids to alleviate dental anxiety. The study was conducted in three dental institutes in Lahore, which limits its generalizability to other populations or settings. Other variables that might affect anxiety levels, such as pain, prior dental experiences, or personality characteristics, were not evaluated in the research. The research relied on self-reported measures of anxiety, which may not accurately depict the participants' actual anxiety level.

## Conclusion

To conclude, it can be stated that using audiovisual aid effectively can encourage patients to undergo dental treatment. Preoperatively showing a tooth extraction film to patients helps minimize dental fear and anxiety related to local anesthetic dental extractions. Audiovisual aids can be of tremendous help to counsel patients and reduce their stress. Accordingly, audiovisual equipment is highly suggested for all dental facilities and institutions to have in order to better handle patients and educate them.

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Original Article

# Intake of Junk Food as an Etiological Factor of Megaloblastic Anemia in Patients visiting Mayo Hospital, Lahore

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## Abstract

**Objective:** The study was performed to determine role of junk food intake in the development of megaloblastic anemia.

**Methodology:** It was a clinical based cross-sectional study conducted at Mayo Hospital Lahore in collaboration with Pathology Department of King Edward Medical University from June 2017 to June 2021. All the patients of age 7 to 70 years including males and non-pregnant females attending the Out Patient Department or admitted in the hospital and having hemoglobin values<12 gm/l, MCV more than 95 fl and bone marrow examination suggestive of a megaloblastic change in the marrow (WHO criteria)were included in our study. The patients who had received blood transfusion or hematinic in less than 6 months before diagnosis and pregnant females were excluded from our study. A total 1333 patients were screened, out of which only 160 patients were diagnosed with megaloblastic anemia who had undergone bone marrow trephine biopsy. Their dietary history was taken in detail and history of depression was noted on validated questionnaires. The obtained data was analyzed on the basis of age groups (7-25 years, 26-50 years, 51-75 years) using SPSS descriptive analysis and results were formulated.

**Results:** The study revealed that 160 (12%) of total 1333 patients were diagnosed with megaloblastic anemia on bone marrow trephine biopsy with male to female ratio of 1:1.28. Total 58 (36%) patients belonged to 1-25 years age group 68 (43%) patients to 26-50 years age group and 34 (21%) patients belonged to 51-75 years age group. Junk food consumption was seen (60.3%) in 7-25 years age group as a prevalent etiological factor.

**Conclusion:** Junk food consumption is the major cause of megaloblastic anemia in young population and poor diet in middle age group, whereas comorbidities are the major etiological factor in older people.

**Keywords:** Megaloblastic anemia, Diet, Junk food consumption, Public health, Comorbidities.

## Introduction

Anemia is one of the most common diseases affecting up to one third of world's population. It is defined as reduction in hemoglobin levels decreased red blood cells count or both. The etiology of anemia can be described in terms of Mean Corpuscular Volume(MCV). It is classified as microcytic (MCV<80 fl) normocytic (MCV 80-100 fl) and macrocytic (MCV >100 fl).[1] Macrocytosis is identified on automated red cell indices and peripheral blood film which is more sensitive. It is broadly divided into megaloblastic and non-megaloblastic types which is confirmed on bone marrow examination.[2] Megaloblastic anemia is characterized by the presence of megaloblastic erythroid precursor cells in the bone marrow. These cells are large in size have immature nuclear chromatin pattern and show asynchrony between nucleus and cytoplasm.[3] It is a common public health problem with a high morbidity rate all over the globe. However limited data is available about its etiological factors in our country. Through this study, we aimed to identify the role of junk food intake in the development of megaloblastic anemia to establish a better treatment and prevention approach.

Megaloblastic anemia results from a large number of causes. However, the major cause is the conditions leading to vitamin B12 and folate deficiency.[4] Both vitamin B12 and folic acid are obtained from diet. Vitamin B12 is obtained from animal sources like meat and dairy products whereas folic acid is mainly obtained from vegetables and cereals.[5] Nearly one third cases of megaloblastic anemia are due to nutritional deficiency. Other causes of vitamin B12 deficiency are pernicious anemia, gastric surgery, intestinal disease and inherited disorders involving transport and absorption of vitamin B12. Folic acid deficiency can be caused by malabsorption, especially in conditions with increased requirements like pregnancy and rapid growth.[6] Another major problem is the increased consumption of junk food which has become a trend in Pakistan due to urbanization. Junk food has low levels of essential nutrients for our body which can deteriorate health if consumed frequently.[7] There is no standard definition of junk foods in the academic literature and most research presume that only products under categories such as salty snacks, desserts and sweets are deemed junk meals. As a result, products that include excessive levels of saturated fat, energy, added sugar, or salt are not classified as junk food (including sandwiches with fewer healthful ingredients, juice drinks, and bakery products) have been omitted from this classification.[8] Studies have shown that nutritional anemia is common in junk food consumers as compared to those who do not consume junk food on daily basis.[9] Meg-

aloblastic anemia has become a major public health problem with increased incidence in the past few decades. Using simple dietary modification, folic acid fortification and lifestyle modifications not only megaloblastic anemia can be cured but can be prevented as well.[10] Dietary habits are an important element of people's lifestyles since they affect health, illness and death for a variety of disorders.

The objective of this study was to determine the role of junk food in the development of megaloblastic anemia which we thought of as an important etiological factor of this disease. By proving its role in the etiology of megaloblastic anemia, we have helped the clinicians in understanding the factors not usually considered important in the disease history and will help clinicians to focus on them.

**Methodology**

It was a clinical based cross-sectional study conducted at Mayo Hospital Lahore in collaboration with Pathology Department, King Edward Medical University, Lahore from June 2017 to June 2021. All the patients of ages between 7 to 70 years including males and non-pregnant females attending the outpatient department or admitted in the hospital and having hemoglobin values<12 gm/L, MCV more than 95fl and bone marrow examination suggestive of a megaloblastic change in the marrow (WHO criteria)were included in our study. The patients who had received blood transfusion or hematinic in less than 6 months before diagnosis and pregnant females were excluded from our study. After taking consent of university review board all the previous data including personal information, medical history, physical examination and investigations of included patients were obtained. This data was reviewed by 2 different people to exclude observational bias. The complete blood count using automated sysmex blood cell counter for Hemoglobin Levels (Hb), Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), Total Leucocyte Count (TLC) and platelet count at the time of diagnosis were observed. Those who had megaloblastic features on bone marrow trephine biopsy were approached for study purpose after institute's permission keeping full confidentiality. Junk food included processed food items like confectioneries/desserts, snacks, fried potatoes, cold beverages, ice creams, pizza, burgers and cheese items. Operational definition of junk food intake was given as intake of any of the listed items once a day for 3 days in a week. The junk food intake was assessed using short form of Fast Food Questionnaire (FFQs) designed by Health Behaviour in School-aged Children (HBSC) study protocol. Poor diet intake was associated with socioeconomic status and it was also assessed using modified form of SES (Socio Economic Status) questionnaire.
In case of comorbidities, the confirmation of diagnosis was established. The data was obtained on the individual proformas of the patients which was strictly used for study purposes only. After obtaining all the required data, statistical analysis was done using SPSS V20 software. The frequency of patients with megaloblastic anemia was calculated. The frequencies of categorical variables were calculated using descriptive statistics. The total patients were divided in 3 groups according to z-score based on age (7-25 years, 26-50 years and 51-75 years). The prevalence of etiological factors in all age groups was obtained using descriptive analysis and the correlation was established between the etiological factors and age group using Chi-Square test on SPSS and results were tabulated. All the patients were counselled as a part of routine procedure and were called to assess the clinical outcome.

**Results**

During our study period of 3 years a total 1333 patients underwent bone marrow biopsy out of which 160 (12%) patients had megaloblastic features on bone marrow trephine biopsy and were diagnosed with megaloblastic anemia. A total 90 (56.25%) patients were females and 70 (43.75%) patients were males. The mean age for male patients 32.86 years and for females 32.8 years showing standard deviation SD of 17.9. The female patients outnumbered the male patients with a male to female 1:1.28. Out of all the patients, 58 (36%) belonged to the age group 7-25 years, 68 patients (43%) belonged to the age group 26-50 years and 34 patients (21%) belong to the age group 51 to 75 years (Table 1).

In the first 1 to 25 years age group junk food consumption was the major etiological factor present in 55.% of patients with a statistically significant correlation (p<0.001), comorbidities were present in 18.1% patients (p value=0.026) Poor dietary intake was present in 31.4% patients (p<0.01). In the second age group of 26 to 50 years and the third age group of 50 to 70years a remarkable decrease in the intake of junk food was observed but the prevalence of comorbidities subsequently increased. Table 2. is a depiction of the percentage of junk food consumed by all the three age groups along with resulting comorbidities. Thable-3 highlights the prevlence of visceromegaly due to intake of junk food and associated comorbidities.

**Table 1.** Patients prevalence according to gender and age Groups.

| Years | Females n(%) | Males n(%) | Frequency (%) | Cumulative Percent |
|---|---|---|---|---|
| 1-25yr | 34(38) | 24(34) | 58 | 36.3 |
| 26-50yr | 41(46) | 27(39) | 68 | 78.8 |
| 51-75yr | 15(17) | 19(27) | 34 | 100.0 |
| Total | 90(100) | 70(100) | 160 | 100.0 |

**Table 2.** Prevalence of Etiological Factors in each Age Group

| Year | Causes of Megaloblastic Anemia | | | | | | |
|---|---|---|---|---|---|---|---|
| | Comorbidity | | Junk food consumption | | Poor diet | | |
| | Count | n% | Count % | n% | Count% | n | % |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Age Gro-pup | 1-25yr | 8 | 18.1 | 35 | 55.5 | 17 | 31.4 |
| | 26-50yr | 14 | 31.8 | 22 | 34.9 | 32 | 59.2 |
| | 51-75yr | 22 | 50 | 6 | 9.52 | 5 | 9.2 |
| Total | | 44 | 100 | 63 | 100 | 54 | 100 |

**Table 3.** Showing the prevalence of visceromegaly in association with etiological factors.

| Visceromegaly | Etiology | | | | | |
|---|---|---|---|---|---|---|
| | Comorbidity | | Junk food consumption | | Poor diet | |
| | n | % | n | % | n | % |
| None | 5 | 16.60 | 64 | 96.90 | 53 | 82.80 |
| Present | 25 | 83.30 | 2 | 3.03 | 11 | 17.10 |
| Total | 30 | 100 | 66 | 100 | 64 | 100 |

**Discussion**

Megaloblastic anemia has shown increased prevalence in the adolescent age in the past few decades all over the world. However, it is more prevalent in countries where malnutrition is a major problem. In Pakistan insufficient data is present regarding its prevalence and etiology. We aimed at determining the frequency and major etiological factors keeping the specific age groups of patients in consideration.

Our study has shown that out of 1333 patients 320 patients were diagnosed with megaloblastic anemia out of which 160 (12%) patients had frank megaloblastic anemia on bone marrow biopsy. Prevalence of megaloblastic anemia is higher in underdeveloped countries like ours owing to economical strains and lack of nutritional awareness besides many other factors.[11] A study done by Magnani et al. in India (2017) showing 12.35% prevalence of megaloblastic anemia among the included population which is in accordance with our study.[12]

Most of the patients present at adolescent age group with a mean age of 32 years showing a female predominance (male to female ratio 1:1.28). A study by Sufi et al. in 2017 has shown that the mean age of presentation of megaloblastic anemia is 31.8+-7.7 years.[13] Another study done by Pandya et al. has shown that highest incidence of megaloblastic anemia is seen in age 40 to 49 years with a female preponderance.[14] Similarly, study done by Khanduri et al.[15] and by Haq et al. in 2012[16] has shownprevalence of megaloblastic anemia in 60 % females with common age of presentation of 40 years.

In our first age group (7-25yr) junk food consumption is the major etiological factor in the development of megaloblastic anemia present in 60 percent of patients. The trend of junk food has become rampant due to urbanization, convenient approach, attractive advertisement and sedentary lifestyle mainly. A study performed by Dunford et al. in 2022 has shown that increased trend of junk food intake is prevalence in youngsters which leads to development of nutritional anemia.[17]

Diet has a major role in the development of megaloblastic anemia. Inadequate diet including decreased intake of fresh vegetables and meat causes folate and vitamin B12 deficiency.[18] In country like Pakistan, socioeconomic burden is the major culprit. Most of the population cannot afford a healthy diet and suffer from diseases associated with poor nutritional intake. Our study has shown that poor diet consumption is the most common etiological factor in all age groups more specifically in middle age which is also the most prevalent age group suffering from megaloblastic anemia. Other causes of vitamin B12 and folic acid deficiency are also present but, in our country dietary causes predominate. Although folic acid fortification has shown a decrease in megaloblastic anemia development in reproductive age but still dietary insufficiency remains a major factor being more prevalent in adults and old age.

Iron deficiency anemia is one of the most commonly associated comorbidities seen in patients of megaloblastic anemia. Both of the anemias are nutritional anemias and can coexist in any patients with nutritional deficiency. A study done by Solmaz. Solmaz in 2014[19] has shown high prevalence of iron deficiency anemia in patients with megaloblastic anemia especially in elderly population. They have also emphasized on the screening of such patients for iron deficiency as it can be masked in patients with megaloblastic anemia. The association of megaloblastic anemia has also been established in patients with acute lymphoblastic leukemia however the pathophysiology is unclear yet.[20]

Mild to moderate splenomegaly is present in patients with megaloblastic anemia as discussed in a study by Behera v. in 2015.[21] They have also reported a case of megaloblastic anemia presenting as splenomegaly that improved after treating the patient. However, it is an uncommon mode of presentation. Our study has shown that visceromegaly is not seen in 122 (76.2 %) and those showing visceromegaly (either hepatomegaly, splenomegaly or both) has associated comorbidities.

In our study we have tried to discuss etiological factors associated with megaloblastic anemia in detail after extensive literature review using validated screening questionnaires but it is difficult to determine the etiology with precision in all individuals. The situation becomes more challenging in elderly patients where different etiologic factors exist at the same time which poses a limitation in our study. Megaloblastic anemia can result in high morbidity but it is a chronic condition that develops over a long period of time thus can be prevented easily once the etiological factors are known. Most of the patients do not present in emergency due to megaloblastic anemia. Hematinic should be started after doing vitamin B12 and folic acid assays. It should be known that hematinic and blood transfusion provide a short-term re-

covery a proper diet with follow up is mandatory for complete recovery. The most important factor is prevention using life style modification and improving mental and physical health. Most of our young population is unaware of ailments and detrimental health effects resulting from junk food consumption. Health awareness programs should be arranged to highlight the importance of healthy eating. The screening for associated comorbidities is recommended.

**Conclusion**

Megaloblastic anemia has shown a prevalence of 12% in our study. It can occur in any age group but commonly affected people are 26-50 years old. Junk food consumption and depression have the main etiological role in youngsters and elderly population respectively. Poor diet and nutrition status equally affect all the population. Prevention can be done using health awareness programs to improve mental and physical health.

**Limitations of this study**

The major limitation of this study is that we could not exclude all co-morbidities from our study, and they can be the major contributing factor in causing me aloblastic anemia, especially in the older age group.

**Conflict of interest**: All authors declare no conflict of interest.

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Original Article

# Efficacy of Therapeutic Needling with Narrow-Band UVB in Patients of Stable Vitiligo

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## Abstract

**Objective**: To determine the efficacy of therapeutic needling with narrow-band UVB in patients of stable vitiligo with type IV skin, which is the most common depigmenting skin disorder, characterized by clearly demarcated discolored patches of various shapes and sizes.

**Methodology:** This descriptive case series was conducted on one hundred dermal skin patches of stable vitiligo in 20 patients presenting to the outdoor of Dermatology Department, Services Hospital Lahore from January- June 2019. They were subjected to therapeutic needling using 30 G disposable insulin syringe followed immediately by Narrow-Band UVB exposure thrice weekly for 6 months. The efficacy was determined by re-pigmentation of patches using "Five Grade Scale System." Patients were clinically assessed during and after completion of therapy. All the detailed information was collected through a specially designed proforma. Procedures and follow up of all the patients were conducted and SPSS version 23 was used to analyze the collected data. Descriptive and inferential statistics were used for present the results.

**Results:** Out of 100 dermal patches of stable vitiligo in 20 patients, 58% patches showed grade 4 response i.e 75% or more re-pigmentation, which is therapeutically the first major step of depigmentation in this process, followed by reduction of pigmentation with further therapies.

**Conclusion:** Therapeutic needling with Narrow-Band UVB is an effective therapy in the treatment of stable vitiligo in patients with type IV skin.

**Keywords:** Stable vitiligo, Narrow-Band UVB, type IV skin , Therapeutic Needling.

### Introducti on

Vitiligo is an acquired dermatosis and presents as sharply demarcated white macules and patches.[1] Regardless of age, sex and race it affects 1-2% of world population.[2] It is primary, circumscribed or generalized pigmentation of skin which might be related to genetic factors, self destruction of melanocytes or oxidative stress. Stable vitiligo is defined as having no new lesions and no progression of existing lesions for at least 2 years. The first and foremost goal for vitiligo surgery is to induce re-pigmentation in depigmented part of skin. Psychological impact is profound in colored races due to stigma attached to it.[3] It has an autoimmune etiology where melanocytes are destroyed by auto-antibodies.[4] The principle of vitiligo treatment is stimulating the existing melanocytes in the affected areas or repopulating it with functioning melanocytes.[5] Medical therapies include steroids, tacrolimus, psoralens, Ultra-Violet A and Narrow Band UVB.[6] In patients refractory to medical treatments various surgical procedures like tattooing, skin grafting and therapeutic wounding are used alone or in combination with medical therapy to treat stable vitiligo.[7]

Therapeutic needling is a new treatment modality in vitiligo in which multiple superficial tiny punctures are made at the periphery of the lesion. These lesions heal with initial inflammatory response followed by epithelization.[8] While narrow band UVB has an Immune modulatory role by depleting langerhan cells in epidermis and dendritic cells in dermis which destroy melanocytes.[9]

The clinical experience with therapeutic needling and narrow band UVB is limited with few reports published in India and Pakistan. From these reports efficacy of therapeutic needling and narrow band UVB is 90% after 6 months of treatment in patients of stable vitiligo.[10]

The treatment of vitiligo remains a serious concern and challenge globally and its treatment options are diverse. This study was planned to introduce therapeutic needling as an adjunct to Narrow Band UVB in non- responding stable vitiligo as it leads to rapid clearance of lesions in short duration of time. There is insufficient literature available on this mode of treatment.

### Methodology

This descriptive case series was conducted on one hundred dermal skin patches of stable vitiligo in 20 patients presenting to the outdoor of Dermatology Department, Service Hospital Lahore from January- June 2019. Hospital Ethical Committee approved the Study. Patients' data were included in the study after informed verbal consent.

Inclusion criteria included patients 14 to 60 years of age, either sex, patients having fitzpatrick type IV skin and with stable vitiligo involving less

than or equal to 10% body surface. We did not include those patient who had photo photosensitivity disorders, hepatitis and bleeding disorder. Pregnant and lactating mothers were also excluded from the study. Those patienst who had sensitive areas around involving sensitive areas like eyelids, genitalia and with poor prognostic vitiligo (segmental, lip tip type, mucosal, leukotrichia, scalp and generalized) were excluded from the study.

Demographic data like name, age, sex, address and telephone was obtained. Previous treatment was stopped eight weeks before commencement of new therapy. Patients of stable vitiligo were subjected to therapeutic needling three times weekly using 30G disposable insulin syringes after cleansing the area with alcohol swab and applying topical anesthesia for 30 minutes. Multiple tiny punctures were given intra-dermally one millimeter apart on the periphery of the lesion, making an angle of 10 to 15 degrees with the skin and pushing the needle from the periphery towards the center of the lesion. Followed immediately by Narrow- Band UVB exposure three times weekly for six months. The three series PC and SP full body phototherapy devices (Daavlin, USA) were used for the treatment.

All the protocol of phototherapy was followed. Minimal dose was calculated according to skin type. Initial dose was adjusted on the basis of 70% minimal erythema dose. The dose was increased 10 to 20% at each visit on the percentage of previous dose and erythema response. The efficacy was determined by re-pigmentation of patches using "Five Grade Scale System"(Table-1). The grading was done as, Grade-4 (76-100%) excellent, Grade-3 (51-75%) very good, Grade-2 (26-50%) good, Grade-1 (1-25%) satisfactory, Grade-0 (0%) poor results. Grade 4 signified excellent results after 6 months of treatment. Patients were clinically assessed during and after completion of therapy. The effects of phototherapy was carefuly observed on the deep pigmented patches areas. All the detailed information was collected through a specially designed proforma. Procedures and follow up of all the patients were conducted and SPSS version 23 was used to analyze the collected data. Descriptive and inferential statistics were used to interpret the results.

**Results**

The mean age of the patients was 19.5 years (SD±6). They included 7 (35%) males and 13 (65%) female patients (Table-2). The mean duration of the disease was 4.54 years (Table-2). In the distribution of patches by efficacy, 58% patches had efficacy of grade-4, 28% patches had efficacy of grade-3, 9% patches had efficacy of grade-2, 3% patches had efficacy of grade-1 and 2% patches had efficacy of grade-0 (Table-3). In the distribution of patches by efficacy after completion of therapy, 95%) patches had efficacy of treatment and 5% patches had no efficacy of treatment.

**Table 1**. Grades of Repigmentation

| Efficacy (Grades) | Percentage | Result |
|---|---|---|
| 4 | 76-100 | Excellent |
| 3 | 51-75 | Very good |
| 2 | 26-50 | Good |
| 1 | 1-25 | Satisfactory |
| 0 | 0 | Poor |

**Table 2.** Distribution of cases by Age, Sex, Duration of Disease

| Age (years) | Patients (no.) | Percentage |
|---|---|---|
| Mean | 19.5± 6 | |
| 11-20 | 14 | 70 |
| 21-30 | 5 | 25 |
| 31-40 | 1 | 5 |
| Gender | | |
| Male | 7 | 35 |
| Female | 13 | 65 |
| Duration (years) | | |
| Mean | 4.54±4.5 | |
| 0-4 | 12 | 60 |
| 5-8 | 3 | 15 |
| 9-12 | 4 | 20 |
| 13-16 | 1 | 5 |

**Table 3**. Efficacy of Treatment using 100 Dermal Patches (n=20)

| Grade | Patients(no.) | Percentage | Efficacy |
|---|---|---|---|
| G4 | 58 | 58 | Yes |
| G3 | 28 | 28 | Yes |
| G2 | 9 | 9 | Yes |
| G1 | 3 | 3 | No |
| G0 | 2 | 2 | No |

**Figure 1.** Therapeutic Needling with 30G Insulin Syringe in Type IV skin

Efficiacy is the capacity to produce an effect. it is the therapeutic effect of the treatment under ideal condition. it was observed that 58% of pateins showed grade 4 response, whereas 28% of trye pateinst demonstrated grade 3 respionse to the treatment (Table 3).

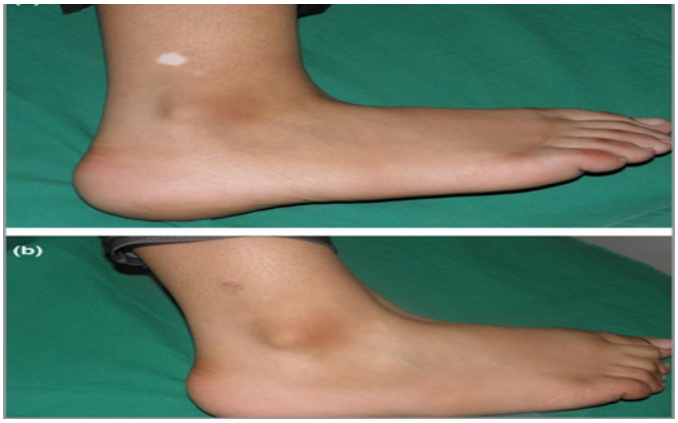


**Figure 2.** Vitiliginous Patches Before and After Treatment in type IV Skin Showing Grade 3 Response.


**Figure 3.** Vitiliginous Patches Before and After Treatment in type IV Skin Showing Grade 3 Response.

**Discussion**

Narrow-Band UVB is one of the first line treatment for vitiligo.[11] New research has shown that Narrow-Band UVB therapy. wounding leads to rapid clearance of stable vitiligo in short duration of time as compared to Narrow Band UVB alone.[12] In our study, 58% patches showed efficacy of grade 4 (excellent), 28% patches had grade 3 (very good), 9% patches had grade-2 (good), 3% patches had grade 1 (satisfactory) and 2% patches had grade 0 (poor). As compared with the study of Ahmad et al10, where 69% patches had efficacy of grade 4 (excellent), 25% patches had grade-3 (very good), 2.4 patches had grade-2 (good), 1.2% patches had grade 1 (satisfactory) and 2.4% patches had grade-0 (poor), which are comparable with our study.

In our study after six months of treatment the efficacy of therapy was found in 95% patches. As compared with the study of Ahmad et al.[10] and Batool et al.[13] where after six months of treatment the efficacy was found in 90% and 91% patch respectively which is comparable with our study. In contrast to our result, Ebadi et al.[14] who used needling once per week and narrow band UVB three times per week, the overall repigmentation was as low as 15.57%. Therefore, they suggested that needling is not recommended treatment for stable vitiligo. In addition, El-Zeftawy et al.[15] conducted a study to compare efficacy of narrow band UVB phototherapy versus combined narrow band UVB phototherapy and micro needling in treatment of vitiligo. In their study, Group A patients treated with narrow band UVB along with micro needling showed 80% efficacy as compared to Group B treated with narrow band UVB alone showed 20% efficacy. Mohaghegh et al.[16] studied the efficacy of narrow band UVB therapy with and without needling by insulin syringe in the treatment of vitiligo. Group B patients with narrow band UVB with needling showed greater improvement in pigmentation with 41.5% efficacy.

In our study, certain anatomical sites like face, neck, trunk and back showed better response while acral parts showed poor response of re-pigmentation. These findings agreed with Sheikh et al.[17] who conducted a study to evaluate the efficacy of combination of needling and narrow band UVB for treatment of vitiligo. They reported that best results were on the face 70%, trunk area 60% and arms 50% re-pigmentation after 12 weeks of treatment. It has been observed that young responded faster with good re-pigmentation (>75%), with lesser number of exposures and cumulative dose of NBUVB. Similarly dark skin (Fitzpatrick type IV and V) required lesser number of exposures and cumulative dose to achieve 25-75% re-pigmentation when compared with white skin (Fitzpatrick type I and II).[15 16 17] In the light of present study it is recommended that the simpler therapeutic needling technique should be used on a larger scale in future in combination with Narrow-Band UVB in the management of stable vitiligo in type IV skin as it results in a significantly higher percentage of de-pigmentation in short duration of time. Adjuvant therapy is better as both work with different mechanisms, therapeutic needling pushes the melanocytes from the pigmented areas of the skin towards the depigmented areas and causes pigmentation of skin while Narrow-band UVB destroys the Langerhan's cells which kills the melanocytes. So both modalities together enhance the clearance of vitiligo lesions in shorter duration of time with less side effects.

**Conclusion**

It is concluded from this study that therapeutic needling with Narrow- band UVB is an effective therapy in the treatment of stable vitiligo with type IV skin.

**Limitations**

The sample size included only 20 patients and thus the results obtained from the treatment cannot be generalized and applied to the entire population. There was also lack of access to scientific literature as few studies were conducted on this topic locally as well as internationally.

**Authors' Contribution**

SA conceptualised the project and wrote the manuscript. UA and ANC did data collection and literature search. AAS co ducted statistical analysis. SA helped with literature search. MAB did the drafting and revisions.

**Conflict of interest**: All authors declare no conflict of interest.

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Origional Article

# Impact of Maternal Education on Breast Feeding and Complementary Feeding Practices of Infants

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## Abstract

**Objective**: To determine the impact of maternal education on incidence of breast feeding, duration and infant complementary feeding practices.

**Methodology:** This cross-sectional study was done in the department of Pediatric Medicine, University of Lahore, Teaching Hospital, Lahore from October 2020 to March 2021. Non probability consecutive sampling technique was applied with a total 198 mothers having children between 6 to 12 months of age were enrolled in study after approval of hospital ethical committee and informed consent taken from the mother. Data was entered and analyzed using SPPS 22.

**Results**: Breast feeding was adopted by 62.8% mothers. Mean duration of breast feeding was 8.52±3.1 months. Regarding initiation of breast feeding 35.1% started immediately after delivery. Regarding introduction of solid feed 27.3% started before 6 months of age. Pre lacteal was given in 35.5% infants. There was no impact of maternal education on frequency of breast feeding (p-value 0.328) but duration of breast-feeding was longer in mother having graduation as compared to mothers having education less than matric i.e. 8.77±2.977 months vs 7.82±3.384 months.

**Conclusion:** Mothers with higher education have greater duration of breast-feeding as compared to mother with less education.

**Keywords:** Breast feeding, Maternal education, Complementary feeding

## Introduction

Initiation of breast feeding within 60 minutes after birth is defined as early initiation of breast feeding by UNICEF and WHO.[1] For better chance of survival breast feeding should start as early as possible.[2] International data suggest that 50% of newborn babies that constitute nearly eighty million babies are not put to breast feeding in first hour of life. Giving pre lacteals rather than colostrum in 1st hour of life deprives patients of beneficial effects of richness of anti-effective substances and vitamin A in colostrum. This deprivation of breast feeding leads to increase morbidity and mortality in children less than 5 year of age. The mortality in neonatal periods constitute fifty percent of death of under-five mortality which is preventable to some extent by providing breast feeding to neonate eventually getting benefits of breast feeding.[3,4] Numerous data on breastfeeding has demonstrated its beneficial effects to newborn babies and on health of mother. The breast milk contains optimal macronutrient to ensure optimal growth and developmental milestone in first six months of infant's life. High Lactose content of the breast milk ensure optimal growth of the brain. The Breast milk is also less immunogenic as breast milk has less protein content and more whey proportion of protein. The breast milk provide protection to the babies against gastrointestinal tract disease by ensuring optimal growth of gastrointestinal tract microbiological flora. The breast milk also has immunomodulating affect that ensure appropriate immune response of a neonate on exposure to an antigen or microbial agent.[5,6]

Early lactation phase also called as immature phase contain colostrum which is small in quantity but contain large amount of anti-infective substance and vitamin A which provide protection against diseases and second mature phase which is sufficient in quantity and contain sufficient amount of carbohydrate, fats, protein, mineral and micronutrients, to ensure optimal growth and neuronal development in first six month of life of an infant.[7] The potential beneficial effect of exclusive breast feeding is not enjoyed by infant only but has early and long-term beneficial effect on health of mother. It is not only provides natural contraception during exclusive breast-feeding period but also have protective affect against ovarian and breast malignancy. The beneficial affect continues in post-menopausal phase as it decreases frequency of osteoporosis and related injuries.[8,9]

There are number of cultural, societal and economic factor which are responsible for initiation and continuation of breast feeding. The most important barrier which prevent initiation and continuation of exclusive breast feeding is socioeconomic barrier. Number of local and international organization have developed policies to promote exclusive breast feeding in first six month of life. There are number of hurdles in implementing and promoting these policies.

These hurdles vary in different communities of the world and include limitation of lactation support program, milk banks, unavailability of educational and interventional program for breast feeding promotion in hospital and at community level. Furthermore, industries providing neonatal and infants formula negatively affect breast feeding initiation and promotion practices.[10]

Rapid growth of the child nearly tripling birth weight substantially increases nutritional requirement of the child making breast feeding insufficient to meet nutritional demands of the child both in term of micronutrients like iron and macronutrient by six months of age. This mark increase in requirement necessitates introduction of complementary weaning diet. This introduction of the food other than milk in infants' diet is complementary feeding as per WHO definition.[10,11]

The introduction of complementary feeding has multiple benefits. It not only fulfils increasing nutritional demands of the babies but also help in development of taste receptors in the babies which will help in acceptance of variety of foods in childhood, prevent infection and malnutrition.[10,12] There are number of factors which influence initiation, continuation of breast feeding and affect weaning practices. The maternal educational status is one of the most important factors regarding breast feeding and weaning practices of infant.[10,13] In one of the studies done by Victor Mogre, among different factors maternal level of education was one of the strong reasons of practicing exclusive breast feeding. It was also suggested, that along with health messages, proper counselling by the health provider should be done to educate the mothers.[14]

This study was conducted to find impact of maternal education on infant feeding practices. Limited availability of the local data about feeding practices makes it difficult to suggest policies to improve feeding practices to eliminate curse of malnutrition which is mounting to 40% in our country. The policies to promote these feeding practices can be more efficiently communicated to educated mother who herself and as a community worker can help in raising awareness in uneducated mother. This will help us in formulating further action plan in dual way one for promoting female education and secondly enhancing community based female participation for raising awareness in community about feeding practices. The main objective of this study was to determine the impact of maternal education on incidence of breast feeding, duration and practices of infant weaning practices.

**Methodology**

We conducted this research in University of Lahore Teaching Hospital (ULTH) children ward from October 2020 till March 2021 after permission of hospital ethical committee vide letter no ERC/09/20/20 date 28/09/2020 and written informed consent from participants. Participants were enrolled using non-probability consecutive sampling technique while World Health Organization calculator was used to determine formula for sample size. Confidence level was kept at 95%, margin of error was kept at six percent, and dropout rate was kept at ten percent. Previous reported frequency was twenty one percent.[8] Sample size was 198 lactating mothers.

Mothers having children up till 1 year of age attending outpatient Pediatrics Department of ULTH were registered under the study after obtaining approval and ethical clearance from the institutional authorities. Verbal consent was taken from the mothers. Demographic details of the study population was recorded. The study population was interviewed with the help of predesigned and pretested questionnaire which included maternal age, education level, number of children type of feeding in 1st six months, timing of initiation of breast feeding duration of breast feeding, any pre-lacteal if given and type and time of initiation of complementary feeding. Confidentiality of data was ensured. All data was entered and analyzed using SPSS 23. Quantitative variables were presented as mean and standard deviation. Qualitative variables were presented as frequency and percentages.

**Results**

In our study mean age of children was 9.64±2.3 months. There were 56.3% male children and 43.7% female children. There were 77.1% females from urban area and 22.5% from rural area. Regarding feeding practices 41.6% were breast fed, 19.5% were formula fed, 17.3% were using fresh milk 16.5% were using breast and formula milk 4.8% were using breast milk along with fresh milk and 0.4% were using fresh milk along with formula milk. Breast feeding was adopted by 62.8% mothers. Breast feeding mean duration was 8.52±3.1 months. Regarding initiation of breast feeding 35.1% started immediately after delivery, 19.9% started within 3 days 7.8% started after 3 days of delivery and 37.2% never breast fed their infants. Regarding introduction of solid feed 27.3% started before 6 months of age 62.9% started within 6 to 9 months, 8.7% started after 9 months and 1.3% not started till age of 1 year. Pre lacteal was given in 35.5% infants. There were 11.3% illiterate mothers 5.6% were having primary education, 8.7% had middle education 17.3% mothers were matric pass and 57.1 were graduate. Most of women were having more than 1 child i.e. 66.7% and 33.3% were having first child. There was no impact of maternal education on frequency of breast feeding, p-value 0.328 but duration of breast feeding was longer in mother having graduation as compared to mothers having education less than matric i.e 8.77±2.977 months vs 7.82±3.384 months. There was no impact of maternal age on frequency of breast feeding (p-value 0.138) and on duration of breast feeding (p-value 0.416). Mothers having less than 4 children has lesser duration of breast feeding 7.05±3.248 months as compared to mothers having more than 4 children 8.77±3.023 months, p-value 0.018.

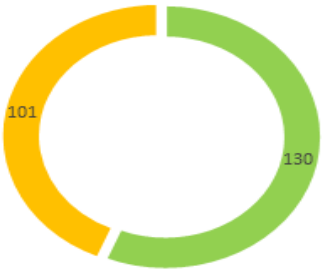


**Figure1.** Gender of Baby

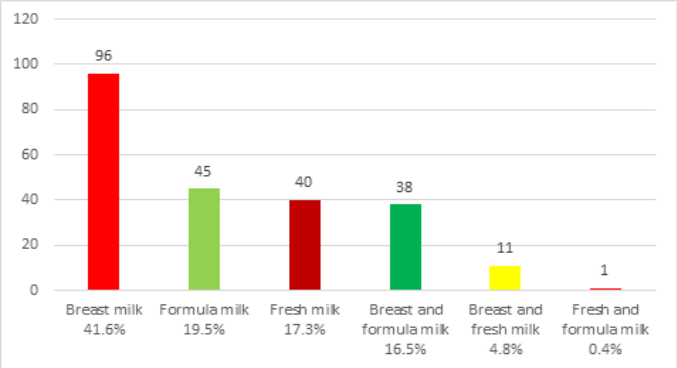


**Figure 2.** Feeding practices.

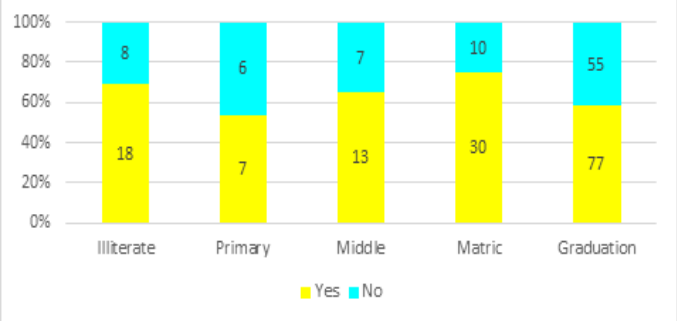


**Figure 3.** Education of Mother and Breast Feeding.

**Discussion**

Our study aimed at observing a link of maternal educational level with feeding practices particularly exclusive breast-feeding and timing of initiation of complementary feeding. We saw a positive relationship between maternal educational level and exclusive breast-feeding and timely commencement of weaning practices. The developing countries share more than eighty percent burden of malnutrition globally. Malnutrition, which constitutes both stunting & wasting and intrauterine growth restriction, is responsible for about 21% of global death in children less than five year of age.

The lack of initiation of appropriate weaning diet in first two years of life is commonest cause of stunting and unfortunately is not reversible. WHO 1000 days' initiative is a global recommendation to prevent malnutrition in first 2 years of life.[15] Energy requirement of the child cannot be met with breast-feeding alone after six months of life. Introduction of weaning diet, which is food other than milk, nutritionally optimal and safe for the child age is mandatory. Complementary feeding for an infant refers to timely introduction of safe, nutritional foods in addition to breast-feeding which includes clean and energy rich additional foods introduced at about six months of infant age. Complementary feeding strategies encompass a wide variety of interventions designed to improve not only the quality and quantity of these foods but also improve the feeding behaviors.[14] In this study, we evaluated the impact of maternal education on feeding practices and breast feeding. In our study total 198 mothers were enrolled breast feeding was adopted by 62.8% mothers. Mean duration of breast feeding was 8.52±3.1 months. Regarding initiation of breast feeding 35.1% started immediately after delivery. Regarding introduction of solid feed 27.3% started before 6 months of age. Pre lacteal was given in 35.5% infants. There was no impact of maternal education on frequency of breast feeding, p-value 0.328 but duration of breast feeding was longer in mothers having graduation as compared to mothers having education less than matric i.e., 8.77±2.977 months vs 7.82±3.384 months. There was no impact of maternal age on frequency of breast feeding (p-value 0.138) and on duration of breast feeding (p-value 0.416). Mothers having less than 4 children has lesser duration of breast feeding 7.05±3.248 months as compared to mothers having more than 4 children 8.77±3.023 months, p-value 0.018.

Our results were consistent with other studies. Klingberg et al. found that timing of starting early complementary feeding, that is, before four months of life has statistically significant differences at different educational level of mother (P<.001). The early introduction of complementary feeding has inverse relation with maternal education as shown by the results of study in which 41%, 29% and 21% of the infant were given early feeding in low, intermediate and highly educated mothers respectively.[10]

In meta-analysis it was found that there is a direct relationship between knowledge of mother about complementary feeding and growth of the child which is demonstrated by a gain in height and weight as shown by a documented increase in weight of 0.30kg (+0.26) and height of 0.49cm (±0.50) in one of similar studies.[16]

In one study done in Florence about duration and different factors affecting duration of breast feeding in over two thousand of near term and term neonates found that percentage of mother continuing breast feeding at 1st, 3rd, 6th, 9th and 12th month of age were 76.3, 64.7, 42.3, 26.4, and 17 percent respectively. This study also found that factors negatively affecting the continuation of breast feeding were weight of less than 3kgs at birth, lower maternal education or mother working as house wife, or laborer working on daily wager basis.[17] A study done in Bangladesh showed that Educated mothers were more likely to give colostrum to their babies than illiterate mothers.[18]A local study which also favors our result that mothers who are educated and those who had taken guideline from health care revealed better knowledge and breast-feeding practices.[19] Another local study endorse our result that maternal education has positive correlation on breast and complementary feeding.[20] In another study conducted in a government hospital of Pakistan, it was observed that maternal illiteracy and both undernutrition and overweight/obesity were prevalent among the mother of undernourished children under the age of two years. Improper weaning was the major contributing factor in child's malnutrition and improper weaning practice was significantly more in mother of younger age group.[21]

Education brings positive changes in mother behaviors makes them more health seeking which make implementation of feeding practices more feasible, numbers of studies are also sup-

porting this fact.[22,23,24] Our results were contrary to the Chinese studies where increasing maternal education has found to be a barrier for breast feeding as shown in a systemic review of 31 studies focusing on maternal education as possible barrier to breast feeding in Chinese culture comparing two distinct groups based on year of maternal education, of six Year and 12 year cut off in group one and two respectively. This contrary finding is likely due to difference of culture and employment of mother with higher education.[25]

**Conclusion**

Maternal education has a positive impact on feeding practices. The illiterate and women in rural communities have hesitancy in talking about breast-feeding with male gender and secondly scarcity of lactation management services make it more difficulty in initiating and promoting exclusive breast-feeding practices. By promoting female education and enhancing educated female community participation, breast feeding and complementary feeding practices can be improved.

**Limitation of Study**

Limitation of our study is that its single center study in one city so the results cannot be true reflection, multicenter study in different cities is need to see the true association.

**Recommendations**

It is recommended to give emphasis on maternal education at the community level. Moreover there is need to have more lactation management programmed at all govt Health care facilitates.

Secondly there is need to have more breast feeding and lactation management programs for pregnant and lactating mother in all health care facilities to cater the need of this segment of society by providing adequate ante natal and post-natal counselling and encouragement of breast feeding.

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Review Article

# Ethical Principles for Medical Student Recruitment in Education Research in Pakistan: A Systematic Review

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## Abstract

**Objective**: With the increasing publication in medical education research in Pakistan, this systematic review aims to identify both addressed and un-addressed ethical issues for student recruitment in medical education research.

**Methodology:** After key search terms finalisation selection criteria were defined for the systematic review. The finalised keywords were put in data bases of Pub-Med, Pakmedinet, and ERIC, revealing a total of 12084 articles. Google Scholar was used as grey literature search leading to 2509 articles. 10056 out of 10087 were removed upon initial screening. A total of 31 met the eligibility criteria according to PRISMA guidelines, out of which 23 were excluded leaving a final count of 8 articles to be included in the study.

**Results:** The ethical issues identified in the selected studies were, Distributive Justice, Autonomy, Rights to withdraw, Coercion into Study, Confidentiality, Informed Consent, Equity in participant selection, Awareness of research participation. Four out of eight studies failed to openly declare the rights of the students to participate voluntarily, while five out of eight studies failed to declare students having rights to withdraw. Three out of eight studies lacked distributive justice of educational content among different groups whereas two studies lacked methodological rigor on participant selection.

**Conclusion:** During the recruitment of students for research, researchers need to be aware of ethical issues and devise a strategy to address them. These issues should be thoroughly addressed before Institutional Review Boards approve data collection. Institutes promoting such research can train and educate researchers by practicing ethical research protocols.

**Keywords:** Medical students, Recruitment, Medical education research, Research ethics

## Introduction

Medical education research often involves medical students, the main stakeholder in the educational processes. The research can range from descriptive studies to case studies from student perception studies to studying the impact of any educational intervention in teaching or learning strategies. In all these researches, the selection of study participants is contextual. While involving medical students in this research becomes crucial as they are the major stakeholders, justifying their selection and the methods involved may become challenging for the educators doing such research. There are multiple methodological and ethical issues that may arise while recruiting medical students as study participants in research. Students may feel bound to participate in research, thereby making them "captive participants".[1] Captive participants are deemed to be those individuals who are independent or restricted relationships with the researcher. Their ability to consent voluntarily is compromised or limited by their vulnerability to the researcher's power.[2] Most commonly occurring cases include students in research where their teacher is conducting research or even trainees of a ward where the supervisor is conducting research. The involvement of students in such cases may lead to a feeling of "coercion" where the voluntary participation of the students seems compromised.[3]

Another ethical issue that may arise may include a breach of trust between the teacher and his students while he is conducting research and yet depriving a group of an educational strategy that may benefit him. This issue of selected beneficence and compromised justice to all may seem to violate the fundamental human rights which in turn marks a question in the integrity of research ethics using students as participants.[4] When teachers assume the role of researchers in education research conflict of interest may need to be addressed.

Analysing the same issues through the lens of ethics these issues can be found in the basic ethical framework of the principles of autonomy, beneficence, no maleficence and justice are commonly referenced.[3] However, no hierarchy of these principles is provided to guide decision making in the research process. On the other hand principles of utilitarianism imply that faculty who recruit students as participants and rely on the coercive aspect of the relationship to encourage participation are justified if the findings of the studies are important to the discipline and to society as a whole. Lastly, within deontological framework, researchers give priority to giving respect to their participants and make sure that their identities are kept confidential and anonymous.

Several methodological issues may arise while using medical students in research. In interventional studies the identity of the participants may be difficult to stay hidden from the teach-

ers, compromising the freedom of speech that the students could use at the time of data collection.[2] The same is the case for conducting focus groups for such students. Additionally, teachers may have issues at the time of participant allocation to a specific group of teaching or learning strategies under study.

It is important that the educators conducting medical education research know the ethical and methodological issues that may be encountered while recruiting medical students. A review is warranted to see which of these issues have been addressed and left out in medical education research in Pakistan as a number of articles using medical students as participants in education research has been on the rise. Hence this reviewed aimed aims to identify both addressed and unaddressed ethical issues for student recruitment in medical education research.

**Methodology**

This systematic review aimed to identify the ethical issues which were addressed or not addressed among the selected original articles related to medical education research in Pakistan between 2016 to 2021. The study objective used PCC criteria to identify the participants (medical students) context using students as study subjects and concept (research ethics). Key search terms were defined as "Medical students, recruitment, medical education research, ethical principles or research ethics" keeping in mind the main research question which was "What ethical principles have been considered in medical education research trials, recruiting medical students as study subjects?". Secondary research question was "Which ethical issues have not been addressed while recruiting medical students as study subjects in medical education research?". After key search terms finalisation, selection criteria were defined for the systematic review.

**Table 1.** Selection Criteria for Studies Identified in Review.

| Selection Criteria for studies identified in review |
|---|
| Article Selection Criteria (Upon title and abstract search) |
| 1. Articles in English Language<br>2. Last Five years<br>3. Original articles<br>4. Studies conducted in Pakistan |
| Full Text Inclusion Criteria |
| 1. Studies with planning and implementation of in-class experimentation.<br>2. Studies using students as research participants evaluates teaching strategy or resource. |
| Full Text Exclusion Criteria |
| 1. Knowledge, Attitude, and Practices studies involving students.<br>2. Studies regarding students' perspectives, or opinion.<br>3. Prevalence/Frequency studies |

***Literature Search***

The finalised keywords were put in data bases of PubMed, Pakmedinet and ERIC revealing a total of 12084 articles. Google Scholar was used as grey literature search leading to 2509 articles. 10056 out of 10087 were removed upon initial screening. (See Figure-1). A total of 31 met the eligibility criteria out of which 23 were excluded leaving a final count of 8 articles to be included in the study. (Annex 1for detailed chart of selected articles data).

**Results**

The systematic review led to identification of eight original articles related to medical education research, recruiting students as study participants. Following themes were obtained after review of the selected articles pertaining to ethical issues related to student recruitment. A brief explanation in context of research practices is also mentioned below in Table 2.

**Table 2.** Identified Ethical Principles with Definitions for Student Recruitment in Medical Education Research

| Ethical Principle | Meaning in Context of Research |
|---|---|
| Distributive Justice | Research Methods ensuring equal distribution of all educational related resources. |
| Autonomy | Allowing students to decide whether to participate in study or not- Voluntary Participation |
| Rights to withdraw | Open statement for rights to withdraw declared in study or not. |
| Coercion into Study | Leading the students to participate in research due to the educational post, researcher is holding. e.g. Being teacher, managing grades/attendances |
| Confidentiality | Keeping identities and data confidential in research especially when researcher is the primary teacher to these students. |
| Informed Consent | Informing students about research in detail for taking consent to involve in study. |
| Equity in participant selection | Making sure that population selection and allocation of groups is not biased or conflicting in any way |
| Awareness of research participation | Making sure students are briefed about research process, their data usage, implication on their academics |

The table above highlights various types of ethical issues identified in the selected studies. As seen from above table four out of eight studies failed to openly declare the rights of the students to participate voluntarily with five out of eight studies failed to declare students having rights to withdraw. Three out of eight studies lacked distributive justice of educational content among different groups whereas two studies lacked methodological rigor on participant selection.

**Table 3.** Identified Unresolved Ethical Issues for Student Recruitment in Medical Education Research.

| Ethical Priciple | Unresolved Ethical Issues |
|---|---|
| Distributive Justice | • Deprivation of learning experience.[5,6]<br>• Deprivation of resources.[7] |
| Autonomy | • Not explicitly declared.[8]<br>• No voluntary participation.[7,9,10] |
| Rights to withdraw | • Not mentioned.[5,6,9] |
| Coercion into Study | • Assumption to include all in study.[5,9]<br>• Was the participation kept mandatory for the course?[10] |
| Confidentiality | • As also declared in the study, some students were uncomfortable to present in front of all seniors.[11] Videotaping was done for role plays.[11] |
| Informed Consent | • Not informing them about research intent.[9]<br>• Informed Consent not mentioned to be taken.[7,12] |
| Equity in participant selection | • Different groups of students, final year having more experience but getting low score gives credibility issue to the institution.[13]<br>• Sampling techniques not clearly mentioned.[5] |
| Awareness of research participation | • Lack of awareness of the study being conducted.[12]<br>• Lack of awareness of research process.[9]<br>• Lack of awareness of implication of performance on their academic record.[9]<br>• Lack of awareness of assessment data being taken for research. |

Three out of eight studies addressed issues of distributive justice with resource provision involving same teacher in teaching all groups, and having a cross over design to allow participants to experience both experiences mentioned in study. Issues of confidentiality was mentioned in one study with informed consent declared to be taken in two studies. Participant selection was addressed in two studies, with only one study providing details of the research process to make participants aware of research process and implication. None of the studies mentioned any strategies to promote voluntary participation rights to withdraw or avoiding coercion into study.

We identified some strategies from relevant literature for addressing ethical issues for student recruitment in Medical Education Research. For Distributive Justice the ethical practices identified were providing resources to all the students.[12] Same teacher, teaching all to maintain uniformity[5] flipping over of groups by a cross-over design.[10] To maintain confidentiality, names of the students were not disclosed[13] informed consent was obtained[5,10] for equity in participant selection same cognition level taken and randomized sampling via computer generated numbers have been done in the past[10] for awareness about research participation students were assured in one of the studies that these marks would not be counted towards their summative scores.[10]

**Discussion**

This systematic review aimed to highlight the ethical issues that the medical education researchers/educators may encounter while conducting studies involving students as research participants in their research. Table-4 shows common principles of research ethics as proposed in an ethical framework for student recruitment in medical education research.[1,13,14] Much of the issues identified in this systematic review revolve around the issues of respect maintaining confidentiality and justice. What remains debatable is that despite the fact whether the researchers are aware of such issues while involving medical education research.

**Table 4.** Ethical Framework Proposed for Student Recruitment in Medical Education Research.[1]

| Core Principle | Considerations for Students |
|---|---|
| Respect | Free, informed and ongoing consent<br>Freedom of consent may be undermined if,<br>Enrolled by either their teacher or the position in authority.<br>Their willingness to participate in the study is informed to their faculty or peer |
| Welfare | Confidentiality<br>Must be crucial if the faculty enrolled in the study have a dual role.<br>Might breached if the inclusion criteria does not fit for all. |
| Justice | Protection of vulnerable groups vulnerability,<br>Is defined by limited decision-making capacity.<br>May stem from undue influence exerted either by faculty, peers or disproportionate incentives |

Strategies to address ethical issues in involving Students in medical education research should include,

***Role of Institutional Ethical Review Boards***

Research proposals submitted to an institution for institutional review constitute a key safety net for researchers involving captive groups in their research: The review protects both researchers and participants. An effective institutional review is not only necessary for the integrity and ethical values of the human participants but also possess a critical minimal insight to the risk of certain factors to the participants.

***Use of participants from captive populations***

Faculty members should also devise strategies to collaborate with students and faculty members of other institutes.[15] Prior to starting any project, explicit informed consent should be obtained from students before using any products of their learning such as assignments, journals, and reflective learning.

***Voluntary and informed consent***

It may be easier to obtain consent from a dependent, captive, or status participant in a research project because of the relationship and the participant's desire to meet the expectations of the more powerful faculty member who is also a researcher.[2,16] Through intermediaries, faculty power can be reduced in student-faculty relationships. Although according to the Nuremberg code, it is a researcher's integral duty and responsibility to ascertain the signing an agreement of the informedconsent.[17,18]

***Data collection***

Before collection of data, faculty should always consider the tools used for the inspection of data either by conducting an interview, analysis of document and observation might affect the participation of the student in the study. In such cases, the employment of a research assistant is essential.

***Confidentiality and Ethical Principles***

The confidentiality of the data should be maintained at any cost especially while conducting a qualitative study in which the researcher has to quote the findings of the participants. The data should be reported in such a way that the identity and participation of the participants should not be disclosed.[18] The researcher should ensure a careful and confidential reporting of the demographic data. In some cases, identifying details from qualitative data may be replaced with generic descriptors in parentheses to prevent disclosure of participant identities.

**Conclusion**

Medical educational researchers might face an ethical dilemma while conducting research that uses the students as participants including informed consent, distributive justice, confidentiality, and issues with coercion. Medical Education Researchers may face an ethical dilemma when they conduct research by using students as participants including issues with coercion, informed consent, student autonomy, confidentiality, and distributive justice. During the recruitment of students for research, researchers need to be aware of ethical issues and devise a strategy to address them. These issues should be thoroughly addressed before Institutional Review Boards approve data collection. Institutes promoting such research can train and educate researchers by practicing ethical research protocols

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