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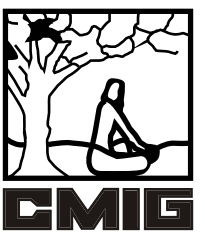

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In addition we welcome Abstracts, Book reviews & Interviews with senior citizens

STREPTOZOTOCIN-INDUCED UPREGULATION OF APP EXPRESSION AND INCREASED OXIDATIVE STRESS IN THE BRAIN LEAD TO DECLINE IN THE RECOGNITION MEMORY IN MICE

Nidhi Anand Singh
Garima Chandra
Utsab Majumder
S. Prasad*

ABSTRACT

Alzheimer's disease (AD) is the most prevalent cause of dementia affecting around 25 million people worldwide. AD is grouped into sporadic AD and familial AD. Sporadic AD being more common results due to wide variety of factors including metabolic factors, genetic factor and environmental factors while, the familial AD arises due to mutation in β amyloid precursor protein or Presenilin genes and proteins. 3xTg-AD is the most widely accepted transgenic animal model to study various aspects of familial AD associated brain dysfunction. However, there is an unmet urge to characterize animal models that may serve as a model for sporadic AD. In the present study, we aimed at characterizing intracerebroventricular (icv) - streptozotocin treated mice model in order to study whether it can serve as a sporadic mouse model of AD. Our data suggests that administration of streptozotocin (STZ) induces significant increase in the oxidative stress i.e. decline in the activities of antioxidant enzymes. Further, we observed this alteration was attributed to significant increase in the expression of βAPP695 protein, which in turn may be associated with its pathogenic proteolytic cleavage to generate Aβ peptides and the genesis of hallmark of the pathophysiology of AD in mice, To investigate whether these alterations leads

to loss cognitive function in mice, the mice were subjected to novel object recognition test. Our behavioral data revealed that the STZ-treated mice performed poorly for the novel object compared that in the normal control mice. Our data clearly suggest that STZ may be used for developing the AD mouse model, which is simpler than generating a transgenic mice

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Keywords: *AD, STZ, icv, SAD, FAD, APP, Aβ, NFT, SOD, CATALASE, GPx, NOR, and ROS*

Abbreviations: *AD: Alzheimer's Disease; SAD: Sporadic Alzheimer's Disease; FAD: Familial Alzheimer's Disease; APP: amyloid precursor protein; Aβ: amyloid beta; NFT: neurofibrillary tangles; PD: Parkinson's Disease; SOD: superoxide dismutase; GPx: glutathione peroxidase; NOR: novel object recognition; BW: body weight; ROS: reactive oxygen species; STZ: streptozotocin; icv: intracerebroventricular; GLUT2: glucose transporter 2; HRP-Horse radish peroxidase; RIPA-Radioimmunoprecipitaon assay; TEMED-tetramethylethylenediamine; EDTA -Ethylenediaminetetraaceticacid; EGTA-Ethylene glycoltetraaceticacid; PMSFPhenylmethylsulfonyl fluoride.*

INTRODUCTION

Alzheimer's Disease (AD) is a neurodegenerative disorder which is predominantly characterized by the presence of two neuropathological hallmarks that include - extracellular deposition of amyloid-beta (Aβ) and intracellular deposits of neurofibrillary tangles (NFTs) comprising of hyperphosphorylated tau, in addition to neuronal loss and loss of memory and cognition (Kamat, 2015). One of the preliminary changes associated with AD brain is oxidative stress. Oxidative stress is also the major contributor in other neurodegenerative diseases like Parkinson's disease (PD) and chronic inflammation (Polidori 2004). Due to extensive involvement of neurons in oxygen consumption and energy production, brain is highly prone to generate oxidative damage and reactive oxygen species (ROS) (Bélanger et al, 2011). During these physiological processes superoxide anion, nitric oxide, hydroxyl radical and hydrogen peroxide are generated. Under non- pathological condition there exists a balance between ROS production and its detoxification by the action of antioxidants (Ahmed et al. 2016). In mammalian cells the antioxidant defense system primarily includes three antioxidant enzymes i.e., superoxide dismutase (SOD), catalase and peroxidases. SOD detoxifies superoxide radical into molecular oxygen and hydrogen peroxide. Peroxidases and catalase detoxifies hydrogen peroxide into water and molecular oxygen (in the case of catalase). The resultant combined effect of these antioxidant enzymes is the conversion of the toxic species into harmless molecules like H2O and O2 (Weydert and Cullen, 2010)

AD is classically categorized into early onset familial AD (FAD) which comprises about less than 1% of all the AD cases world wide, caused by mutation in presenilin-1and 2 or β amyloid precursor protein (APP). The late onset sporadic AD (SAD) which is a condition that arises due to multifactorial causes (Iqbal and Grundke-Iqbal, 2010; Waring and Rosenberg, 2008). APP is a transmembrane protein which undergoes sequential processing through the involvement of different enzymes to produce Aβ peptides of varying length and

becomes the elemental part of extracellular senile plaques in AD as well as in aging (Sivanandam and Thakur, 2011). The Aβ senile plaques diffuse into the synaptic cleft and are found to interfere with synaptic transmission (Tiwari et al, 2019). The other hallmark of AD is associated with the conformational loss of tau protein, which is one of the utmost abundant microtubule bundles stabilizing protein present in the neurons. tau protein in association with several other proteins play a key role in maintainingthe neuronal cytoskeleton i.e. it is the key player in providing structural framework to the neurons. It does so by promoting the assembly of tubulin into microtubules. In AD due to loss of the structural conformation, tau losses its ability to bind to microtubules and thereby becomes ineffective in providing the normal structure to the neuronal cytoskeleton. This change in conformation leads to anomalous aggregation of tau in the form of fibrillary tangles in demented individuals. The normal regulation of the tau activity is mediated through its phosphorylation state i.e. phosphorylation of tau mediates its assembly and also contributes to its binding efficiency to microtubules. However, abnormal hyperphosphorylation of tau leads to loss of its biological abilities as well as causes its aggregation into tangles intracellularily (Sergeant, Delacourte, and Buée 2005). The key player in governing the level of phosphorylation of tau in both normal as well as pathological condition is GSK3 (Schedin-Weiss et al 2014). Also, the aggregated Aβ senile plaques and hyperphosphorylated neuritic plaques is later recruited with microglia. This leads to activation of microglia in these regions, which promotes local inflammatory response that ultimately leads to neurotoxicity (Ahmed et al 2016).

Varieties of animal models have been used for extensively studying since for the last two decades to investigate the precise mechanism underlying AD pathologies in order to explore the novel therapeutics for the same. Majority of these animals models are transgenic in nature and are produced by overproduction of human APP, PSI, PSII and/or tau. These transgenic models are invaluable and complicated tool to decrypt the various aspects and pathologies associated with AD. However, none of these models have so far represented a suit-

able model for the SAD, because SAD does not arise due to mutation in any of the above mentioned genes. Therefore, to study the root cause and to discover novel therapeutics there is always a need of an unmet requisite to develop and characterize an animal models that can be a used as a suitable one for the SAD (Chen et al 2013). Several investigations in the past few decades have proposed that intracerebroventricular (icv) administration of Streptozotocin (STZ) meet some of the criteria to be regarded as a model of sAD (Grieb, 2016). STZ is a glucosamine nitrosourea compound derived from soil bacteria Streptomyces achromogenes (Grieb, 2016). Being structural analogue of glucose, this is transported within the cells via a glucose transporter 2 (GLUT2) and which is extensively employed to induce experimental models of diabetes mellitus when injected intraperitoneally or intravenously. The administration of STZ through other routes like icv is found to produce oxidative stress, neurodegenation by DNA damage via alkylation process which leads to initiation of decline in memory and cognition (Kamat, 2015).

MATERIALS AND METHODS

1.1 Reagents and chemicals

All the chemicals used in the study were of molecular biology and analytical grade and were procured from Merck, India or Sigma, USA. The anti- βAPP695 and anti β-actin were purchased from Thermo Fischer Scientific and HRP conjugated secondary antibody against anti-rabbitprimary antibody was obtained from Genie, Banga lore, India. STZ was purchased from Sigma, USA, citric acid and sodium citrate were purchased from Merck, India.

1.2 Animals

For experimentation, the Swiss albino male mice of the age group 8-10weeks, weighing around 25-30g were used in the experiments. Mice were kept in animal house of Department of Zoology, Banaras Hindu University, Varanasi, India. Mice were maintained at 25 ± 2°C RT with relative humidity of 44-56% and also 12:12 hour light and dark schedule was strictly maintained. Mice were given with stan-

dard food pellets manufactured strictly for rodents and water was provided with ad libitum.The study included three animal groups including 6 mice in each group i.e. Sham, vehicle controls and STZ-treated. Our study was in accordance with the guidelines approved by Banaras Hindu University's Animal Care and Use Committee (IACUC) for the proper handling and rational use of animals.

1.3 Drug delivery

Route of drug delivery utilized to induce SAD in the present experiment was intracerebroventricular injection. STZ was dissolved in citrate buffer of 0.5M of pH 4.5, because of its maximum stability at this pH. 3mg/kg BW of STZ with total volume of 5µl was injected in each lateral ventricle stereotaxically. Vehicle group received an equal volume of citrate buffer. The specific site used for drug injection was -0.8mm anteroposterior, 1.5mm lateral and -4.0 dorsoventral relative to bregma (K lann et al 2020). Anesthetia were used in accordance with the study carried by Deshmukh et al (Deshmukh et al 2009).

1.4 Novel Object Recognition (NOR)

NOR test was conducted to assess decline in cognition with certain modification. Since mice have inherent preference to explore novelty i.e. if mice encounters both familiar and novel object, they will spend more time in exploring novel object. The preference for novel object is regarded as a measure of cognitive memory and learning. NOR test is conducted in three phases, in sequence, i.e. habituation, training and testing. For three consecutive days each session was conducted once a day in prescribed order. The first day accorded 10 min habituation phase in a black box of dimension 30cmX30cmX28cm for each mouse. On the training period, two identical objects were centrally placed and mouse was allowed to explore them freely for 10 min. On the testing day, one of the object (familiar) used during training session was replaced by a novel object and mouse was allowed to explore them freely for 5 min. Whole of the activity performed by mice were video recorded and exploration time for each object, the number ofentries into the novel object and discrimination

index were all analyzed using ANY-MAZE software. Preference for either novel or familiar object for different group of mice were evaluated by the discrimination index using the formula [Discrimination index = (novel object exploration time/total exploration time) – (familiar object exploration time/total exploration time) × 100] (Antunes and Biala 2012).

1.5 Brain tissue isolation and processing

On 21st day, mice were euthanized by cervical dislocation in accordance with the guidelines of IACUC of BHU. Lateral incision was made to remove skull bones and to procure intact whole brain. The brain was then immersed in ice- cold phosphate buffered saline (PBS), the adherent blood was removed and brain was transferred to wet blotting paper. Cerebrum was carefully dissected out, pooled, washed with ice-cold normal saline, blotted dry between folds of Whatman 1M filter paper and was stored at -80^{o}C to carry out biochemical assays.

1.6 Assessment of oxidative stress:

A 10% homogenate (w/v) of the pooled brain was prepared in ice-cold buffer containing 50mM Tris (pH 7.4), 0.5 mM EGTA and 1mM EDTA to extract total native protein. The homogenate was centrifuged at 12,000xg for 20 min at 4^{o}C. Throughout the process the samples were properly maintained at ice-cold temperature to avoid any denaturation of protein. After centrifugation the supernatant was collected and was analyzed for its protein content using Bradford method (Ernst and Zor 2010).

1.7. a In-Gel assay of SOD activity

To study the activity of SOD under varying experimental condition 40µg total protein from all the three groups i.e. Sham, vehicle and STZ-treated were mixed with loading dye comprising 10% glycerol, 10mM Tris HCl (pH 7..4) and 0.0001% bromophenol blue and was resolved on 10% native polyacrylamide gel (PAG). After the complete run, the gel was washed in autoclaved triple distilled water (ATDW) with utmost care and was stained in mixture containing

28mM TEMED and 1.23mM nitro blue tetrazolium (NBT) for 20 min and thereafter, the gel immersed in staining solution was irradiated under fluorescent light till the appearance of achromatic bands.

1.7. b In-Gel assay of catalase

60µg total protein was loaded onto a 8% native PAG from sham, vehicle and STZ-treated groups. After the electrophoretic run the gel was washed in ATDW and was incubated in 0.003% H_2O_2 for 15 min in dark. After incubation with H_2O_2, the gel was stained in solution containing 2% ferric chloride and 2% potassium ferricyanide and irradiated under fluorescent light for the appearance ofbands.

1.7. c In Gel assay of GPx activity

Native PAGE electrophoresis of tissue extracts was carried out to evaluate the activity of glutathione peroxidase. The extracts containing 60µg total protein was loaded onto a 10% native PAG as described earlier. After the run the gel was carefully removed and washed with ATDWand was poured in with 50mM Tris HCl buffer (pH: 7.4) containing 0.0004% H_2O_2 and 13mM reduced glutathione (GSH) with gentle shaking for about 5-10 min in dark. After incubation with H_2O_2 mix, the gel was stained with 1.2mM NBT and 1.6mM phenazine methosulphate (PMS) and exposed under fluorescent light till the appearance ofclear bands.

1.8 Western blot analysis

RIPA buffer comprising of 50mM Tris (pH: 7.4), 1mM EGTA, 150 mM NaCl, 1 µg/ml protease inhibitor cocktail and 100µg/ml PMSF was used in order to prepare 10% homogenate of pooled cerebral tissue. The resulting homogenate was centrifuged at 12000xg, supernatant was collected carefully without disturbing the pellet and was aliquoted and stored at -20^{o}C for use in future. The total protein content of the extract was analyzed using Bradford's method. The required volume of aliquots were mixed with sample buffer containing 100mM Tris Cl (pH: 6.8), 2% β- mercaptoethanol, 20% glycerol and 0.2% bromophenol blue, heated in boiling water bath for 5 min and again centrifuged at 12,000xg for 20min at 4^{o}C. After centrifugation, clear

supernatant was collected and 20µg protein was loaded in 8% SDS-PAGE geland was electrophoresed. After the run, the gel was removed with upmost care and proteins were made to get transferred onto polyvinylidenedi fluoride (PVDF) membrane employing overnight wet transfer procedure. Following transfer the PVDF membrane was stained with Ponceau-S in order to ensure the extent of protein transfer. The membrane was then blocked in 5% non- fat milk powder dissolved in 1XTBST for 2h at RT. Thereafter, the membrane was incubated with anti- βAPP_{695} (1:1000 dilutions) primary antibody with gentle shaking at $4^{o}C$ overnight. On following day, the membrane was washed thrice with 1XTBST for 5 min each time and the blot was then incubated with anti-rabbit HRP- conjugated secondary antibody (1:1000 dilutions) in 1XTBST containing 5% non- fat milk for 2h at RT. After incubation with secondary antibody the blot was washed again in 1XTBST thrice for 5 min each. The blot was also processed with rabbit monoclonal anti β-actin antibody (1:25,000 dilutions, Sigma Aldrich, USA) simultaneously to determine the level of β-actin as an internal control. Employing enhanced chemiluminescence (ECL) method, the signals of respective blots were developed on X-ray film. Signals on the X-ray film were densitometrically quantified using Alpha-Imager 2200, a computer assisted densitometry Program. Scanned value of βAPP695was normalized using scanned value of β-actin and the data was represented as relative density value (RDV) for βAPP_{695}

.

1.9 Statistical analysis

Each experiment was conducted thrice (n=3). Data was represented as bar value expressing mean ± standard error of means (SEM) using SPSS 16.0 Software for windows. Student's t-test and one way ANOVA were employed to examine statistical difference between groups. For multiple comparisons, Turkey's post-hoc test was used after one way ANOVA. $p<0.001$ and <0.01 values were considered as statistically significant.

RESULTS

2.1 Effect of icv injection of STZ on NOR

Our data on the assessment of novel object recognition ability indicates a significant decline in the exploration time for the novel object by STZ- treated mice group in comparison to the Sham control. The STZ-treated mice also lost the abilty of discrimination between familiar and novel objects compare to their nomal and vehicle-treated control counterpart. This indicate a significant decline in recognition memory and cognition in the STZ treated group (Fig:1)

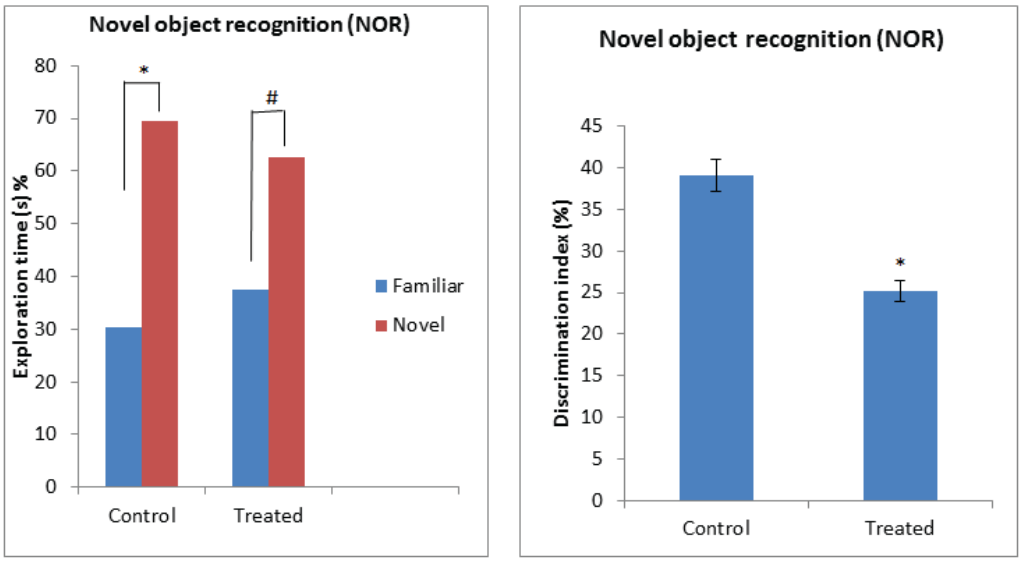

Fig.1: NOR Test:
(a) Time (s) exploring the novel object and the familiar object.
(b) Discrimination index in the novel object recognition test. * Signifies the p- value<0.001, #signifies the p- value <0.01

2.2 Effect of STZ on the activity of SOD

Our in- gel enzyme assay data reveals that the SOD activity significantly decreases in the brain of STZ-treated mice group in comparison to that of control and vehicle groups, suggesting arousal of oxidative stress in the treated group.

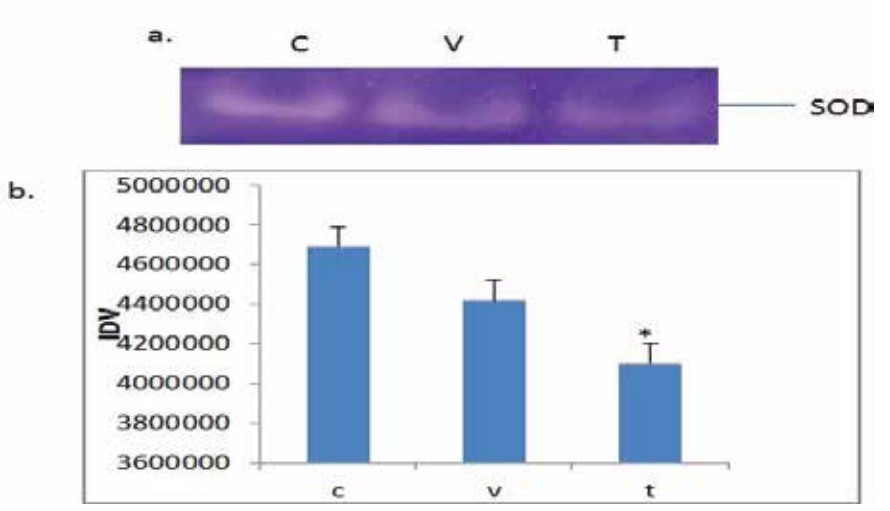

Fig.2: In gel assay of SOD activity. (a) Effect of STZ on the activity of SOD analyzed through in gel assay in the brains of control (c) vehicle (v) and STZ treated (t) mice (b) Densitometric analysis of SOD activity. *Signifies the p-value <0.001.

2.3 Effect of STZ on the activity of Catalase:

Similar to SOD, the activity of catalase is also found to decrease in STZ treated mice model in comparison to control and vehicle groups.

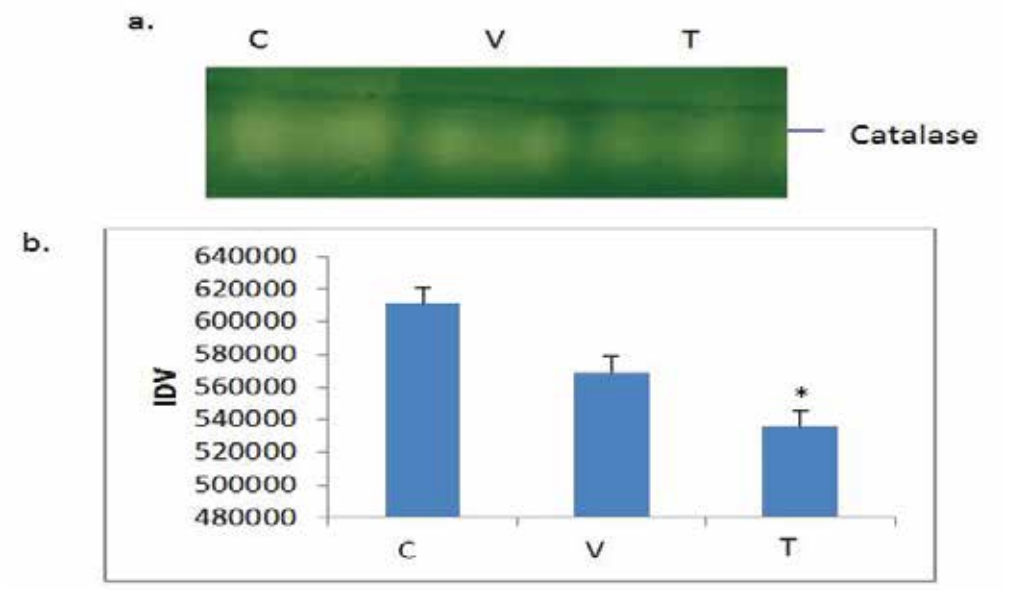

Fig.3: In gel enzyme assay of catalase activity. (a) Effect of STZ on the activity of catalase analyzed through in gel assay in the brains of control (c), vehicle (v) and STZ treated (t) mice (b) Densitometric analysis of SOD activity. *Signifies the p-value <0.001.

2.4 Effect of STZ on the activity of GPx:

The in-gel enzyme assay of GPx also suggests creation of oxidative stress condition in STZ treated mice group in comparison to control and vehicle.

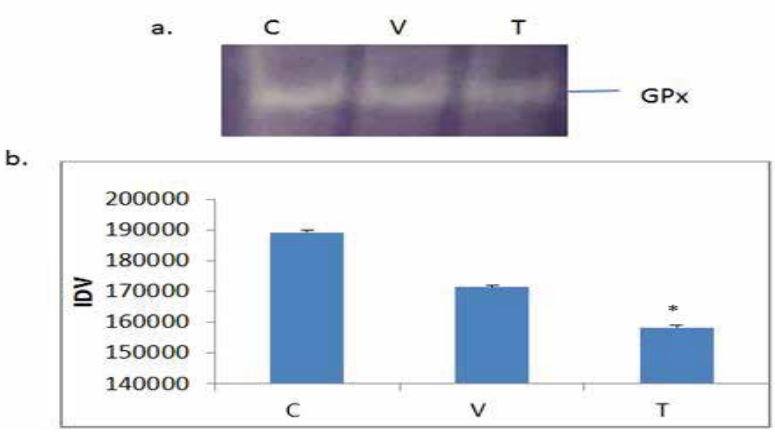

Fig. 4: In gel assay of GPx activity.Effect of STZ on the activity of GPx analyzed through in gel assay in the brains of control (c), vehic le (v) and STZ treated (t) mice (b) Densitometric analysis of SOD activity. *Signifies the p-value <0.001.

2.5 Effect of STZ on the expression of βAPP695:

Western blot data analysis reveals that there is an increase in the expression of βAPP_{695} in STZ treated mice group in comparison to control group. The increased level of APP may enter amyloidogenic pathway and leads to aggregation of Aβ peptides of varying length, the hallmark of AD. Also, uniformity in the expression of β-Actin level suggests equal loading of protein lysates in respective lanes.

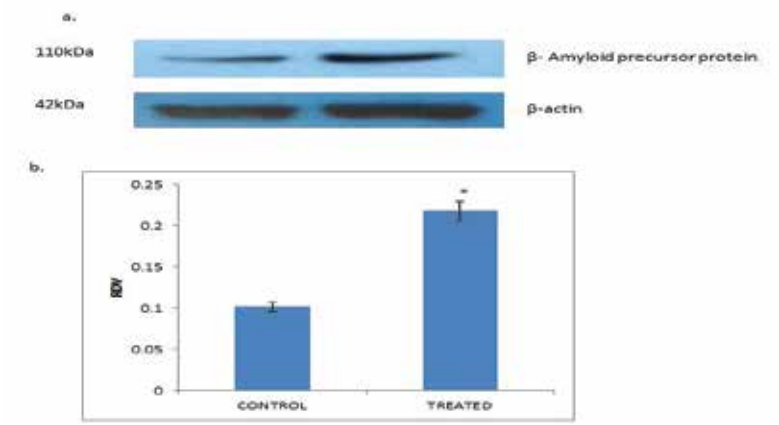

Fig.5: (a) Western blot analysis of β- amyloid precursor protein expression in brain of control and STZ treated mice (b) Densitometric analysis of β APP695 at protein level. *Signifies the pvalue <0.001.

DISCUSSION

Metabolically, brain is an active organ requiring enormous amount of energy in order to maintain its normal physiological function. Abundance of lipid content, high energy requirement and weaker antioxidant defense capacity makes brain highly susceptible to oxidative damage. Oxidative damage and free radical production theories suggest that they are the key players in mediating neurodegeneration i.e. relaed to AD (Grieb, 2016). Oxidative stress mediates damage to various macromolecules including nucleic acid, protein and membrane ion transport system(Singh et al 2016). In neurodegenerative disorders including AD, there arises an imbalance between pro-oxidants and antioxidants. These factors together leads to excessive production of ROS and it ultimately leads to decline in the overall functional aspects of neurons(Masella et al. 2005)(Sciences 2020). Hence, it can be concluded that oxidative damage arises due to imbalance between ROS production and its clearance from the body involving the aid of antioxidants, as ROS possess the potential to cause tissue damage (Silva et al. 2004); (Rammal et al 2010).

It is well established with the above presented data that the level of SOD, CAT and GPx are decreased in the animal groups treated with STZ indicating oxidative damage, which will lead to neuronal decline, as these the antioxidants primarily predominating in mammalian system (José et al 1997). In the present study significant cognitive decline was observed exploiting the inherent ability of rodents to explore novel objects in comparison to familiar objects, in the animal group treated with STZ. STZ-treated animal group show remarkable inability in discriminating novel and familiar objects on the Novel Object Recognition (NOR) test paradigm. Hence, in accordance with several other studies in past, impairment in short- term memory can be implicated in STZ treated mice using NOR. Along with antioxidant assay, in this study we also aimed to investigate the effect of STZ on the expression of protein playing major role in the pathophysiology of AD i.e. analysis of APP expression.

As already mentioned above, APP is a transmembrane protein, however, its precise function in unclear. But APP is thought to be involved in maintaining the normal physiology of brain (Nalivaeva and Turner, 2013). APP undergoes its sequential cleavage by the action of a group of proteases called secretases, which are integral membrane bound proteases. APP is cleaved in an orderly fashion, initially by α-secretase or β-secretase and then by γ-secretase. Under normal circumstances, APP is processed employing α- and γ-secretase. The α-secretase cleave APP 83 from its carboxyl terminal. The γ-secretase cleaves APP twice. One out of the two cuts is found to take place at 50 amino acids from carboxyl terminus of APP while, the other cut is somehow variable, but is highly intended to occur at 57, 59 and 61 amino acids from the APP carboxyl terminus. Sequential cleavage by the combined effort of α and γ secretase results in a large N- terminal peptide called soluble APPα (sAPPα) and P3, a smaller peptide of 3KD.

If β-secretase and γ-secretase works in coordination for the processing of APP, then there arises Aβ peptides of varying length, playing part in pathophysiology concerned with AD. Action of β- secretase on APP produces a larger N- terminal peptide commonly referred as sAPPβ and also a smaller C-terminal fragment called CTFβ. The CTFβ is the substrate for the enzymatic activity of γ-secretase in AD (Sheng, 2018; Swerdlow, 2007). Our data may indicate that increase in oxidative stress and overexpression of APP is associate with alterations in synaptic plasticity by affecting the hippocampal or the frontal cortical glutamate receptors such as AMPA or the NMDA receptors which might underlie the impairment in the recognition memory and thus the cognition.

As suggested by the above result there is over expression of APP in animal group treated with STZ. The first report on the over expression of β-APP using transgenic mice and subsequent development of primary AD pathological hallmarks i.e. aggregation of Aβ, NFTs and synaptic loss was reported in 1995 (Games et al. 1995). So, in line with transgenic models of AD, where there is over expression of

APP followed by its amyloidogenic processing to produce Aβ peptides, the icv-STZ treated model also suggests over expression of APP, which may enter amyloidogenic processing leading to Aβ peptides formation. Our work also shows that the icv administration of STZ by stereotaxy techniques is simpler than the transgenic model system and this may provide the way to look into the underpinning mechanisms leading to detailed studies onthe sporadic AD animal model.

CONCLUSION

Our findings clearly suggests that after the icv-STZ administration there are changes in mice brain as observed in human AD patients and therefore the present model could be regarded as a reasonable sporadic model of AD and may also be used to decrypt the precise molecular mechanisms underlying AD pathologies.

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Consequence of Stress and Strain among the Single Aged during COVID-19 Pandemic – Reflection from Housing of Kolkata

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Abstract

The present study is an attempt to understand the stress and strain of the aged who are residing alone during COVID-19. The present outbreak disrupts the life of the single aged. They face lots of hurdles in their day-to-day life and experience fear of death anxiety during this period. So, the present study aims to reflect continuous anxiety faced by the single aged living in a housing of Kolkata on EM BYPASS during COVID-19. To fulfil the aim, the study highlights different objectives. Here both qualitative and quantitative data were collected through semi structured interview schedule and all the respondents were interviewed over telephone and WhatsApp video call. Finally this micro study reveals that this pandemic has brought unprecedented challenges to humanity and presents a severe threat to the health, lives, rights and well-being of older persons who are living alone. This situation can negatively affect the physical and mental health of older persons, particularly those with cognitive decline or dementia, and who are highly care dependent. It is expected that this devastating pandemic will not only compel the aged to maintain safety measures for a better living but also enhance their immunity to combat the pandemic for the coming future.

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***Key words**: Stress, Strain, Single aged, COVID-19, Pandemic*

Introduction

Globally, the number of 60+ population is growing rapidly than the other age group. As a result, the share of elderly people in the total population is rising everywhere in the world (United Nations, Department of Economic and Social Affairs Population Division, 2015). Like most other countries, India is also experiencing the consequence of demographic shift, i.e. population ageing since independence.

Due to industrialization and modernization, feelings of loneliness of the elderly are gradually increasing. In spite of living in the midst of the family they are still feeling alone (Malhotra, 2018). Problems of adjustment very often compel them to live alone or to reside in an old age home. Besides adjustment, there is some other factors like higher education, economic independence, death of the spouse etc. which insist them to live alone (Panigrahi, 2009). In India, the percentage of elderly living alone has increased from three per cent in1998-1999 to five per cent in 2005-2006. It has also been projected that in India the number of the aged living alone will increase more in the coming years (Agarwal, 2012; International Institute for Population Sciences and ORC Macro, 2000). According to 2011 Census, almost 15 million aged were living all alone in India. In urban areas, nearly 25.3 percent of the aged and in rural areas around 21.38 per cent of the aged are living alone (Agewell Foundation, 2018).

Once the phrase ‘Intimacy at a Distance’ was only applicable in western countries only. But in the present situation it is applicable all over the world and India is not exception to this phenomenon. The present trend highlights that economically well off elderly people desire to live independently and prefer to maintain some distance from their children (Shanas, 1979). In such a living though they can maintain their autonomy but due to cognitive decline they become the victims of different kinds of psychosocial problems which create loneliness and anxiety in their day to day life. These changes become inevitable because they cannot release their stress and strain. Now it is present researcher’s endeavour to explain the term ‘stress and strain’.

According to Luthans (1998) “Stress is an adaptive response to an external situation that results in physical, psychological and/or behavioural deviations for organizational participants”. Stress appears in both positive and negative way. Stress is said to be positive while situation gives an opportunity to one to gain something. The term Eustress used to describe positive stress. It is negative while stress is related with heart-disease, alcoholism, drug abuse, marital breakdowns, absenteeism, child abuse and a host of other problems like social, physical, organizational and emotional problems. Stress is related to constraints and demands. Constraints and demands can lead to potential stress. When they are associated with uncertainty of outcome and importance of outcome, potential stress becomes actual stress. Emotional distress is common among people who are experiencing chronic pain (Gatchel, 1996). Emotional stress associated with the experience of negative affect, like anxiety, and in context of physiological stress response which contains cardiovascular changes as well as hormonal changes. Emotional stress commonly occurs when one realizes that he or she does not have adequate personal resources to fulfil situational demands effectively (Lazarus, 1966).

In such a backdrop, the present micro study tries to understand the impact of stress and strain created by Corona Virus Disease-2019 (COVID-19) pandemic among the older persons who are living alone. The risk of infection and death is much higher among older adults belonging from above 85 years of age. At old age emotional alienation, social and financial insecurity are already present among elderly, but nation-wide lock down due to COVID-19 creates more stress and strain among the aged. These unwanted situations manifest different psychosocial problems like - sleeplessness, anxious feeling, panic attacks, nightmares, feeling of emptiness, and fear of contracting COVID-19 and spreading the infection to others, health related anxiety, anxiety about death and dying in unnatural circumstances without access to other relatives etc. All these situations have a great impact specifically upon the single aged because they are living alone and do not have anyone to share their tension. In

such a setting, it is expected that the present study will be able to portray daily life hazards, mental stress and fear of death of the single aged during COVID-19 in a compressed manner.

Keeping the above backdrop in mind the present study aims to reflect stress and strain faced by the single aged from a housing of Kolkata on EM BYPASS during COVID-19 Pandemic. The study will highlight – (i) the socio-demographic background of the aged, (ii) kind of perception about COVID-19, (iii) nature of problems they encountered in daily life, (iv) kind of problems they faced regarding health hazards, (v) mental stress and fear of death of the respondents during lockdown period, (vi) assistance of voluntary associations and finally (vii) coping strategies of the single aged during COVID-19.

METHOD OF STUDY

The present study has purposively selected a lucrative housing on EMBYPASS (located in the eastern part of Kolkata) the AVISHIKTA – I Housing. Due to some prior informal connections, forty aged respondents (male – 14, female – 26) who are living alone were selected. All of them are Bengali Hindus. Here, field data were collected through a semi structured interview schedule. Majority of the aged respondents (37 out of 40) were able to use computer and internet. So they prefer to send the interview schedule through email because they wanted to see the interview schedule before giving information. Due to COVID pandemic, respondents were interviewed over telephone and WhatsApp video call. However face-to-face discussions (through WhatsApp video call) were arranged prior to their convenient time. Different pre-set questions were asked to each respondent about their problems during COVID-19 pandemic.

Analysis and Discussion

Table-1: Socio-demographic Background

	Characteristics	Percentage
Gender	Male (14)	35.0%
	Female (26)	65.0%
Age Group (Years)	60-70 (21)	52.5%
	71-80 (10)	25.0%
	81 and above (9)	22.5%
Marital Status	Unmarried (7)	17.5%
	Widower (9)	22.5%
	Widow (22)	55.0%
	Divorced/ Separated (2)	5.0%
Level of Education	Higher Secondary (11)	27.5%
	Graduate (23)	57.5%
	Post Graduate (5)	12.5%
	Others (Technical Qualification) (1)	2.5%
Occupation Before 60 years of Age	Govt. Job (18)	45.0%
	Private (8)	20.0%
	Self employed (1)	2.5%
	Housewife (13)	32.5%
Duration of Stay in the Present Location	Less than 5 Years (6)	15.0%
	5-10 Years (29)	72.5%
	More than 10 Years (5)	12.5%

Note: Number within the bracket indicates the total number of respondents

Before an analysis is undertaken with regard to age-gender distribution, it may be mentioned that the cut-off age for the elderly has been taken as 60 years, which incidentally is the age of retirement in the organized sectors of India when the study was undertaken. Taking that as the parameter, the aged are divided into three age groups, namely, 60-70 years, 71-80 years, and 81 years and above (Neugarten,

1974) irrespective of gender. The data reveal that elderly females are more in number than their male counterparts. Gender difference also becomes more pronounced. In the context of population ageing, in most parts of the world, elderly females generally outnumber their male counterparts due to higher life expectancy. In the present study the percentage of aged females is higher. Starting from the lower age group that is 60-70 years, the percentage of aged females increase. It is also very important to note that as the age increase both the number and percentage of the aged female respondents also increase. This trend is similar to the national and international situation.

The study also depicts that widower and widow respondents are outnumbering than unmarried and divorced respondents. In India the proportion of widows is much higher as compared to widowers which are an important feature of India's aged population. The present study also shows that the age-specific prevalence of widowhood among male aged is comparatively lower than their female counterpart. The proportion of widows increase with the onset of ageing. So, the distribution of aged respondents by their marital status shows a reflection of feminization of ageing and widowhood.

In the present study all of our respondents are educated. Except eleven respondents (male- 2, female- 9) who were able to continue their education up to higher secondary level, rest of the respondents were able to continue their education either graduation or post-graduation level. However, majority of the respondents were able to continue their education up to graduation. So it may not be an overstatement that all the aged respondents are from a well of family background which helps them to continue their higher education. Even the parents of the female respondents were also conscious which helped them to continue their higher education. So it may not be an overstatement that this good educational background helped the aged respondents to get a good job.

After education, occupation is an important aspect in any person's

life. During interview emphasis was given on the nature of occupation of the respondents. The data reveal that most of the male respondents were in government service followed by private and self-employment respectively. Whereas, majority of the female respondents were housewives and continue this work even after 60 years of age. This trend reflects that traditionally Indian women are bound to maintain their domestic chores till the physical capacity permit. However, a small section of the female respondents were working both in organized and private sector. Currently they retired from their jobs. Thus it is evident that most of the respondents have a better economic affordability due to their financial condition.

Next to occupation, place of birth has been an important cultural attribute for identification of a person's habit, ideas, beliefs etc. After the collection of data, it was noticed that among our respondents, there is a kind of cluster that perhaps was a direct fall out of partition of Bengal at the time of independence. It is an obvious consequence that in a housing of Kolkata, there are migrants, rehabilitated persons and local population which indicates heterogeneity. It is nothing but a typical characteristic of the mega polis like Kolkata. However, the thing which naturally comes with place of birth is duration of stay in the present location.

Duration of stay for a long period in a particular area generally influences the person's overall social behaviour. This is all the more true and likely in case of the aged people. With regard to duration of stay in the present housing, a sizeable section of the aged respondents are residing in the AVISHIKTA-I housing of Kolkata on EM BYPASS for 5-10 years. A sizeable section of the aged females living at AVISHIKTA-I Housing more than ten years. Very few of the respondents dwell here less than five years. So it is apparent that all the respondents settled at AVISHIKTA-I after their retirement from their respective jobs. This is a normal trend in the present time where aged parents try to maintain their identity and autonomy with their close kins at a distance.

PERCEPTION ABOUT COVID-19

As COVID-19 is a completely new type of viral infection. During interview it was asked to the respondents about reliable sources of knowledge and information about it. It was reported that the main source of primary information about COVID-19 was through social media.

Table- 2: Different Perceptions about COVID-19

Source of Knowledge about Novel Coronavirus (N = 40)				
Sources	**Usage patterns of sources**			
	Not at all	**Sometimes**	**Frequently**	**Mostly**
Social Media	3.2	6.5	20.3	70.0
News Media	2.0	19.5	24.5	54.0
e-Government	4.2	24.1	19.3	52.4
Family and Friends	29.2	20.0	15.0	35.8
Religious Announcement	20.1	21.4	20.3	38.2
Political Publicity	9.0	28.3	31.2	31.5
Knowledge about Novel Coronavirus (N=40)				
Items	**Opinion of the respondents about the knowledge**			
	Do not believe	Probably	Agree	Strongly agree
COVID-19 is thought to be originated from nature	4.1	9.2	14.3	72.4
COVID-19 is thought to be originated from animals	49.0	24.1	20.0	36.9
COVID-19 is thought to be originated from laboratory	20.5	25.4	30.2	23.9
COVID-19 is transmitted through air	9.5	15.2	10.5	64.8
COVID-19 is transmitted through personal contact	4.6	7.6	8.4	79.4
COVID-19 is transmitted through fecal-oral route	9.5	7.3	16.2	67
Headache, Fever, Cough, Respiratory problems are signs of COVID-19	2.5	5.5	8.7	83.3
The incubation period of COVID-19 is 2-14 Days	3.6	4.5	7.6	84.3
COVID-19 leads to pneumonia, respiratory problems and death	21.2	15.6	17.7	45.3
Hand hygiene, musk use, avoid sick contacts prevent COVID-19	8.7	9.5	8.8	73.0

Perception of the Aged about COVID-19 (N=40)		
Statements	**Opinion of the aged**	
	Yes	No
COVID-19 is a natural curse	95.0	5.0
COVID-19 symptoms appear within 4-5 Days	100.0	-
COVID-19 is fatal	70.0	30.0
Influenza vaccine is sufficient to prevent COVID-19	20.0	80.0
During pandemic outbreak fresh fruits and vegetables are not safe	55.0	45.0
During pandemic only boiled and cooked food, fish, meat is safe	97.0	3.0
Sick patients should share their history with health personnel	65.0	35.0
Disinfection of utensils and working area is needed once in a day	60.0	40.0
4-5 times hand washing with soap/ alcohol and water can prevent from COVID-19	85.0	15.0

As COVID-19 is a completely new type of viral infection. During interview it was asked to the respondents about reliable sources of knowledge and information about it. It was reported that the main source of primary information about COVID-19 was through social media. A significant number of the respondents mostly used it as a source of primary information and next segment was news media which include print and electronic media. However, other sources were from family and friends, and political publicity issues with COVID-19 to get information about COVID-19. After Source of Knowledge, it was asked to the respondents about the knowledge of Novel Coronavirus. We know that there are different sources of viruses, some are completely natural and some are from the wild animal. Mass media and social media circulated that the new virus is laboratory made. Aged respondents in this study also had mixed reactions. Initially majority of them believed that it came naturally. During interview, they informed that in course of time they have changed their views specifically in the context of mode of transmission. From scientific media they came to know that COVID-19 infection can be transmitted through the air, personal contact and faecal-oral routes. During face-to-face discussion it reveals that a significant portion of them (34 out of 39) strongly believe the above mentioned mode of transmission except some few.

They also informed that the symptoms of COVID-19 are primarily manifest in the form of common headache, fever, cough and sore throat. Therefore, it can be difficult for people to differentiate between COVID-19 and common headache, fever, cough and sore throat. Respondents suspected in advance that if the COVID-19 diagnosis is not provided for every human being properly in a fast and easy way, the pandemic could be widespread, disrupting the health and medical care system. Most of them, specifically the 70+ respondents of both gender were very much sceptic about the symptoms of the disease. They were very afraid that the viral disease COVID-19 does not usually show its symptoms as soon as it enters the human body. Symptoms usually occur within 8-14 days. Thus the manifestations of the disease symptoms make a sever panic among, whether they were affected by this disease or not.

However, in a congested mega city like Kolkata, the virus is spreading in such a rapid manner that it is easy to spread from one person to another very easily. COVID-19 sufferers usually lead to pneumonia, respiratory failure, and death, although these are unknown to doctors or experts. Nevertheless, due to the wide spread publicity through various media, some ideas have arisen among the common people. In such a critical condition, patients' transferring to the intensive care unit immediately after high-powered oxygen even becomes necessary for ventilation. The medical sector in Kolkata, especially in the government-run system, is inadequate for the current general patient. In that case, if such a powerful virus spreads quickly across the country, it can be virtually impossible to handle it officially. This fear of uncertainty makes our respondents very much scared about the infection.

However, other than the infection, it was also a tremendous problem for them to intake fresh fruits, vegetables, and non-veg items in the daily food menu. From different social media they came to know that without proper disinfectants nothing can be taken. This message make them more worried because for washing of vegetables and other food items they were searching for sanitizer but it was not readily

available. It was practically impossible for them to collect sanitizer from a shop which was far away from their residence. Besides, collection of hand sanitizer for washing hands also created a tremendous problem. As a result they were unable to sleep properly in the night. Therefore it can be said that a significant gap regarding the source of information, poor knowledge levels, and discrepancies in the perceptions about COVID-19 thus observed among the aged respondents.

CASE STUDY:

How Elderly People have perceived the COVID-19 Threat

How people react to known dangers are well studied, but what if the danger is something not encountered before? Young and old Indians today wouldn't recall any threat which was even remotely like the COVID-19. In the present study Mr. Roy, retired from Govt. Jobs, currently pensioner living alone. He said that he is very anxious and it is not easy for him to know how people would react to the COVID-19 threat. He is the chronic patient of diabetes and hypertension. For this reason he is always very much afraid. Mr. Roy also expressed that his habit of searching over the internet ultimately came to his rescue. He said that he also got information about COVID-19 and its preventive measures from social media (Facebook, WhatsApp, You Tube), family members and news channels. He knew that COVID-19 infection can be transmitted through the air, personal contact and faecal-oral routes and elderly people with co morbidities are more prone to Corona virus. So, he adopted some measures to prevent COVID-19 such as, maintaining one metre distance, cleaning hands with soap and alcohol based sanitizer and avoiding personal contact and other preventive measures prescribed by World Health Organization (WHO). He believed that these measures can protect people from getting infected with COVID-19.

Health and Health care Situation during COVID - 19

Health is an important aspect in every stage of human life. For several reasons, health needs of older adults are different from others.

The physical and mental conditions of the aged do not remain what these used to be in their earlier life. As a result they are more susceptible to ailments and diseases (House & Others 1990).

With the advancement of age, it is generally found that the physical and mental health of a person gradually declines. On the physical side, both ailments and diseases co-exist with the elderlies. Age and ailments therefore sometimes are described as concomitant (House et.al 1990). In the present section an effort has been made to understand the nature of ailment and health care practices among the aged during COVID-19 pandemic. Their self reporting reveals that irrespective of gender, the numbers of major ailments are more than the minor ones. It can also be mentioned that the multiplicity of ailments (both minor and major) increase with the advancement of age irrespective of gender as a natural process. In terms of minor diseases both the genders reported that they were suffering from various minor ailments like arthritis, digestive disorder, cough and cold, insomnia, weakness, constipation, vertigo with swelling of limbs, hypertension.

While the nature of major health problems from which they are suffering are -Arthritis, asthma, cardiac problems, digestive disorder, diabetes, genitourinary problems and dementia are the major ailments are found all the districts under study irrespective of gender. Here also the term major diseases mean the duration of sufferance is more than three months in a year.

Besides the occurrence of minor and major health problems, there are also a number of chronic ailments such as, cough and cold, piles, problems of joints/limbs, blood pressure etc. which create serious problems amongst the aged respondents. Among the respondents, the ailments of joints/limbs, blood pressure and undifferentiated cough are three of the several chronic problems that often afflict the aged of both genders. Both diabetes and urinary problems as chronic diseases are more frequent among the respondents. In this regard, it may also be mentioned that these chronic diseases are

found concomitantly in an elderly individual irrespective of gender, age group and multiplicity of these diseases (minor, major and chronic) increase as their age progresses.

Regarding treatment, majority of the respondents prefer private doctors for their treatment which indicate their economic affordability. So this trend is similar to the fact that income influences the choice of health care. As regards to place of treatment, respondents prefer to go to poly clinic instead of going to any private doctor because of multiplicity of diseases. Due to quick recovery, mostly aged male respondents prefer Allopathic medicine. During telephonic conversations it was also reported that due to unavailability of homeopathic and Ayurvedic medicine at local medicine shops, some kind of anxiety and tension was created among the respondents which in turn create a tediousness among them. Most of them expressed their helplessness during conversations.

Current Level of Feelings, Fear of Death, Coping Strategy and Perception of the Aged about Future Situation

Table-3: Current level of feelings, Fear of death, Coping Strategy and Perception of the Aged about Future Situation

Current level of feelings and Fear of death of the Aged Respondents													
Gender and Age Group	Current level of feelings during lockdown					Current level of feelings during quarantine			Fear about Death				
	Extremely anxious	Anxious	Neutral	Rarely Anxious	Not at all anxious	Alone	Sad	Irritated	Extremely anxious about death	Anxious	Neutral	Rarely anxious	Not at all anxious
Male													
60-70 (n=8)	5 (62.5)	1 (12.5)	-	-	2 (25.0)	2 (25.0)	1 (12.5)	5 (62.5)	5 (62.5)	2 (25.0)	-	-	1 (12.5)
71-80 (n=3)	2 (66.7)	1 (33.3)	-	-	-	1 (33.3)	-	2 (66.7)	2 (66.7)	-	1 (33.3)	-	-
81 and Above (n=3)	2 (66.7)	-	-	-	1 (33.3)	-	-	3 (100.0)	3 (100.0)	-	-	-	-
Female													
60-70 (n=13)	9 (69.2)	3 (23.1)	-	-	1 (7.7)	2 (15.4)	3 (23.1)	8 (61.5)	8 (61.5)	-	2 (15.4)	2 (15.4)	1 (7.7)
71-80 (n=7)	4 (57.1)	-	-	2 (28.6)	1 (14.3)	2 (28.6)	1 (14.3)	4 (57.1)	5 (71.4)	1 (14.3)	-	-	1 (14.3)
81 and Above (n=6)	5 (83.3)	1 (16.7)	-	-	-	1 (16.7)	-	5 (83.3)	4 (66.6)	1 (16.7)	1 (16.7)	-	-

Coping Strategy and Perception of the Aged about Future Situation								
Gender and Age Group	How much effective is your coping strategy				Perception about Future Situation			
	Very Much effective	Moderately effective	Mildly Effective	Not at all Effective	Very Much Hopeful	Hopeful	Mildly Hopeful	Not at all Hopeful
Male								
60-70 (n=8)	4 (50.0)	3 (37.5)	1 (12.5)	-	-	-	5 (62.5)	3 (37.5)
71-80 (n=3)	1 (33.3)	-	1 (33.3)	1 (33.3)	-	-	2 (66.7)	1 (33.3)
81 and Above (n=3)	2 (66.7)	-	-	1 (33.3)	1 (33.3)	-	-	2 (66.7)
Female								
60-70 (n=13)	6 (46.1)	4 (30.8)	2 (15.4)	1 (7.7)	-	-	5 (38.5)	8 (61.5)
71-80 (n=7)	4 (57.1)	-	2 (28.6)	1 (14.3)	2 (28.6)	-	3 (42.8)	2 (28.6)
81 and Above (n=6)	3 (50.0)	-	2 (33.3)	1 (16.7)	-	-	4 (66.7)	2 (33.3)

On the evening of March 24, our Prime Minister Narendra Modi announced that the entire country would go under lockdown from midnight to stem the spread of corona virus. In the days, irrespective of economic and social class, wealthy and poor, in the heartland and in distant corners, have faced up to the fear of a pandemic spreading across the globe. It was commonly reported by our respondents that they faced serious health complications especially those with underlying chronic diseases. Mostly majority of them felt a phobia that hypertension, diabetes, and heart diseases can exaggerate the risk of serious complications during COVID lockdown. In such a situation, anxiety was one of the most common psychological problems because they face various types of deficiencies and disabilities at this period of life. During discussions, majority of them reported that they became more prone to anxiety due to reduced self-confidence, decreased activity and mobility, losing friends, physical independence, and chronic diseases. The most common type of this anxiety was death anxiety. Death anxiety is a feeling of panic, fear, or great worry caused by thinking of death, being detached from the world, or what that would happen after life. The high prevalence of death anxiety among the elderly was due to the fact that they suffered from many physical problems, chronic diseases, movement disorders,

physical disabilities, and dependence on others. The discussions reveal that retirement and the ensuing loneliness contribute to death anxiety among our respondents. On the other hand, when daily life shrinks, small things can matter more. Our respondents are living alone. Some of them ordered their meal either for lunch or dinner and meal delivery staff may be the only person they meet on a daily basis. To meet with friends and relatives were an important way for them to feel socially connected with the outside world. However, due to the lockdown policy, all these services and programs were no longer available. All of them considered these restrictions as the major cause of their feelings about social isolation and loneliness. Moreover, lack of regular social activities and staying at home for a longer time make a deep impact on their emotional feelings. To avoid all these mental agony and boredom feelings and to avoid distressing situation, they specifically maintained not to get exposed to media coverage too much, to maintain a healthy relationship, get in touch with friends and family members on a regular interval using social media and start thinking positively. When corona virus anxiety increased, they tried to share the fear with others, which will calm the fear, and also try to increase self-awareness by getting adequate sleep, exercising regularly and employing different relaxation techniques through gossiping with friend and neighbours in mobile. In these ways they tried to cope themselves even in the lockdown situation. However, our 80+ respondents practically lost their hope for a complete virus free situation.

CASE STUDY :

COVID-19 Pandemic and Death Anxiety in the Elderly

Anxiety is a natural response to stress that causes increased alertness, fear, and physical signs, such as a rapid heart rate and other associated problems. However, when the reason for anxiety is uncertain and continuous, as in the current corona virus disease (COVID-19) pandemic, fear can become chronic and burdensome. Mrs. Bagchi, seventy years old, widow, retired school teacher, living alone, chronic patient of hypertension and depression. In spite of

lockdown, for purchasing vegetables and other kitchen items, she had to go outside in the local market. In such a circumstance, suddenly she was affected with fever, cough and cold. Her family doctor advised her COVID-19 testing for cough and fever symptoms. Then she tested positive and advised to quarantine at her home. During this period she was tremendously anxious about death. Her daily attendant prohibited her services, so she had to maintain everything by alone. When her close door neighbours were walking around her house, they waving a greeting through hand movements. It makes her pleasant and more relaxed. She got information about the COVID-19 from social media and the news channels. She expressed that those news increased her anxiety, loneliness, and stress. Ultimately with the help of her neighbour, she contacted with a counsellor and the counsellor suggested her some way out. In course of time she realized that the dynamics of her anxiety which appeared at the time of covid-19 pandemic, increased different forms of anxiety like worry, fear, dizziness, and sadness. As concerns over the COVID-19 news and message rapidly increased her fear of death and dizziness. Another form of concern is overprotective behaviour that results in a high degree of awareness of taking precautions to protect herself from COVID-19. But after scheduling her daily chores and establishing phone contact with her relatives, she got significant improvement and the counsellor advised her to continue the activities throughout lockdown to remove anxiety and fear of death.

Assistance from Different Voluntary Associations

Older people are a vulnerable section of society during COVID-19 lockdown. Not only COVID-19 but also their age and related health problems make them more vulnerable in this situation (Sawant, 2020). Due to this nation-wide lockdown, aged who are currently living alone are facing lots of difficulties in their day-to-day activities. Generally in old age, people lost their strength and moving abilities. So they need care giver. But due to COVID-19 and maintaining social distancing they have to prohibit their care givers to come to their home. For this reason, all of our aged respondents face hurdles in their day to day activities. During this period everyday they have to

go to the local market for groceries because they are not able to carry heavy weight and in medical shops they stand in long line for their necessary medicines. At this age their immune system become weak and their daily contact with the people increase the chance of diseases, infections. So in such a circumstance, different voluntary associations take some initiatives to help senior citizens by giving medicines, groceries so that they face no inconvenience. Sometimes the voluntary associations assist aged in hospital visits also. During COVID-19, the aged respondents of AVISHIKTA-I Housing also get help from three voluntary associations and the name of those associations are- Panchaboti, Prayas and Mukti Fresh.

Here all volunteers of those associations wear masks, use sanitizers and keep a safe distance from the aged. If the volunteers get permission to enter into the housing, then they provide the essentials to the doorstep of aged if not then they leave the essentials to the security guards. Here aged people of this housing make phone calls to the different volunteers team (One team for Medicine, Second team for groceries, Third team for vegetables and Fourth team for emergencies) of those associations and inform them about their essentials. Accordingly the volunteers deliver essentials like medicines, groceries and vegetables within few days. Before come to this housing the volunteer teams inform the aged about their (volunteers) arrival time and the price of the essentials by phone calls. Here these associations also provide their services in emergency situation and most importantly they provide these services at free of cost. In case of emergency they come to the housing and take the respondents and reach them in hospitals or to the private doctor. So here the voluntary associations perform an important role during this pandemic situation and their care and assistance for elderly help the aged to survive in this outbreak.

Coping Strategy of the Aged Respondents during COVID-19

Globally, COVID-19 affected several lives and is steadily raising its reach. Elderly people are more vulnerable in COVID-19 infection due

to their decreased immunity and body reserves, and multiple associated diseases like diabetes, hypertension, chronic kidney disease and chronic obstructive pulmonary disease (Ministry of Health and Family Welfare, 2020). It creates different types of problems among aged.

In the present study the interview was conducted through telephone and WhatsApp video call. During telephonic interview, all the respondents express their coping strategies during COVID-19 and also reported that this pandemic has drastically altered their life styles and help them to overcome the stressful situation. Here they properly follow the health advices of their doctors and maintain the guidelines given by WHO and Ministry of Health and Family welfare. In this study all of the respondents are well educated and majority of the aged respondents (37 out of 40) are familiar with computer and internet use. So they get more accurate information about Coronavirus and properly maintain the coping strategies which help them to overcome the stressful pandemic situation.

The coping strategies of the aged respondents during the COVID-19 are as follows –

Items	Coping Strategies
Food	Maintain a diet rich in vitamins (E, C) and minerals, fruits (papaya, and guava) and vegetables (eggplant, bell peppers, beetroots, spinach, and cauliflower, broccoli); Intake 8-9 glasses of water per day; Adding herbs (garlic, ginseng, black cumin and liquorice) in their food
Health	Clean their hands with an alcohol-based hand rub or wash them with soap and water; Avoid touching eyes, nose and mouth; Wash their handkerchief after coughing or sneezing; Wear mask and maintain at least 1 metre (3 feet) distance with others whenever they go to outside
Social Networking	social networking or movements of the aged become restricted; Phone calls and video calls in WhatsApp, and Google duo helps them to connect with other people; Avoid to go crowded places but due to the financial and health requirements they go to bank and medicine shops (face lots of hurdle during March to April) and market; Panchaboti, Prayas and Mukti Fresh associations help them by giving groceries and medicines
Recreational activities	To stay in touch with God they pray inside their house (Before this outbreak the aged respondents went to different religious institutions like temple and nearby other religious institutes)
Exercise and Meditate	Did some home workouts, yoga postures and walking indoor and meditate in home (help them to feel relax and less anxious)
Take breaks from listening news	**Use credible sources like the website of Ministry of Health and Family Welfare and World Health Organization to get Coronavirus updates; In case of doubt ask to their family members and friends**

CASE STUDY:

Using the Telephone, Social Media, and Social Networks

Mrs. Biswas, approaching eighty years, widow, retired as a school teacher, living alone. Currently she is suffering from gastrointestinal disorder, chronic arthritis and hypertension. At this age, due to nationwide lockdown, she couldn't even leave the home or walk to the park. In such a condition, to cope with high blood pressure and to keep herself busy, she called her children every day. They know that she will call them to ask questions. Besides, sons and relatives, everyday she made contact with a number of friends. Every day she uses WhatsApp to chat with her children, also use Face book and Messenger and this interaction helped her to keep active to avoid all forms of boredom. During this period everyday she has to go to the local market for groceries because she is not able to carry heavy weight and in medical shops she stands in long line for necessary medicines. The persons in the medical shops were very reluctant to attend an old people. For this reason, she was worried and full of anxiety. During interview, she narrated that she was always anxious due to her chronic health problems. She prayed to god for her good health and not to happen any health issue which can compel her to go to the health Centre. So, whenever she went outside, she always wears mask, eye goggles and maintain at least one metre (3 feet) distance with others. During discussion Mrs Biswas repeatedly mentioned that the outcomes of COVID-19 are stressful for older persons and fear, stress, loneliness, and social isolation are significant stressors associated with the COVID-19 situation. Only their social networks can provide social support and served as a coping mechanism to remove empty – nest situation during lock down.

OBSERVATIONS AND CONCLUSION

This world has witnessed different nature of epidemics and pandemics several times during the late nineteenth and early part of the twentieth centuries. Recently, all of us are experiencing and suffering from a pandemic named COVID-19. This pandemic shakes the

whole world and has been damaging country after country. The current outbreak disrupts the existence of human life but the chance of damaging is high among older people. The virus is not just threatening the lives and safety of older persons; it is also threatening their social networks, their access to health care ser¬vices. Age groups over sixty are at risk of contracting COVID-19, significantly higher risk of mortality and severe disease following infection with those over 80 years. Due to this reason, single aged were selected as a target group for the present study. The study reveals the horrible experience of the single aged during COVID-19 Pandemic. This micro study is unable to reflect the general trend because of purposive selection of the respondents; therefore findings are restricted to the aged respondents only.

Finally the study depicts that this Corona virus pandemic creates unprecedented challenges to humanity and presents a severe threat to the health, lives, rights and well-being of older persons specifically those who are residing alone. COVID-19 significantly damaged their social networks and negatively affects the physical and mental well-being of those older persons who are suffering from cognitive decline or dementia. It is expected that this devastating pandemic will not only compel the aged to maintain safety measures for a better living but also enhance their immunity to combat this pandemic for the coming millennium.

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REACTION WITH FREE TIME ----
A STUDY ON CALCUTTA PENSIONERS

Dr. Indrani Chakravarty*

Abstract

Human life is essentially related to purposeful work, which urges an individual to apply his faculties to the fulfilment of his inherent urge to be a social being. Such activity is also a source of respectability of an individual. But the term retirement and 'work' seem somewhat contradictory. Retirement is perceived as a state of withdrawal or disengagement from active life resulting in decreased interaction. It is a concept which opposed to work, the world of free time, rest and meditation. Those who have retired from service and free to spend their time as they please, cannot naturally enjoy just whiling it away. This enforced leisure is neither sought after nor desired and may create feeling of burden and unhappiness in the lives of the pensioners. One of the important problems of retirement is the 'use of time' which hardly received any attention.

The present study is a step the gap in this direction and aims at understanding the psycho-social problems of leisure being faced by a group of urban pensioners.

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METHOD

The study is made on Bangalee middle-class Hindus who are residents of Calcutta and retired from West Bengal Government services. To prepare the sampling frame the Pension register maintained by the Accountant General Office of West Bengal was used.

The total male population were classified according to their last occupation into four strata. These four strata virtually correspond to the Class-I, Class-II, Class-III & Class-IV employees of the state government. The individuals were selected by simple random sampling without replacement from each stratum. But the selection of respondents from all occupational groups was not equally proportioned. So the tables were based on 'weighted counts' using stratum specific multiplier as weight. All the respondents were interviewed personally on a pretested structured schedule. random sampling without replacement from each stratum. But the selection of respondents from all occupational groups was not equally proportioned. So the tables were based on 'weighted counts' using stratum specific multiplier as weight. All the respondents were interviewed personally on a pretested structured schedule.

RESULT

An attempt has been made to assess the amount of free time that the retired are getting. By analysing their daily routine it is found that free time at the disposal of the respondents varies for different categories. Nearly 40 percent of the respondents have more than 6 hours of free time, 25 percent have 4 hours to 6 hours, 15 percent have 2 hours to 4 hours and the rest have up to 2 hours.

It is observed that half of the Calcutta pensioners experience difficulty in utilising their free time. Time hangs heavily on 48.45 percent of the pensioners. They feel bored for not being able to use their free

time in some meaningful activities. The respondents cite various reasons for their boredom. Table-1 shows that poor use of the leisure time originates from (1) financial constraints (2) poor health conditions and (3) lack of work. Health and finance are important variables which restricts activities of these individuals. But a large section of Calcutta pensioners complain that they do not find any suitable substitute activity of the regular office work to which they are accustomed. Hence they cannot escape from the continuous boredom of daily life. Graney (1975) also found that the amount of time that an individual spent in various activities was significantly related to happiness and changes in the levels of these activities had a negative impact on a happiness of the aged.

The analysis has been carried further and the feeling about the time has been correlated with other social variables. These are educational achievements and occupational background of the pensioners

Education of a person influences significantly his capacity to utilise time in constructive activities. A number of studies have shown that education is an important variable, which influences the social behaviour of an individual. Table-2 reveals the level of education and the feeling of the respondents about time. It may be seen from the table that higher level of education, lower is feeling of boredom and frustration. Those who are educated up to the primary level have the highest score of boredom those who are graduates scarcely feel bored. This shows an important role of education in broadening the sphere of application of one's abilities and in stimulating interests in various activities. Educated person generally have the mobility to switch over to a variety of activities when faced with crisis of transition.

Apart from education, occupational expertise during active life is another important variable to influence the mode of utilisation of the leisure time of pensioners. Table-3 examines the relationship of the Calcutta Pensioners between the type of service they were engaged in before retirement and their reaction after retirement. According to

the 'National Classification of Occupation' the respondents have been divided into four categories on the basis of their last occupation. These are (1) Administrators, high executives and other decision makers 21%, (2) Doctors, Engineers & other Professionals, (3) Clerks & assistants and (4) Unskilled labourers.

The table mentioned above shows an interesting result. Utilising leisure is not a problem for professionals (2) followed by decision makers (1). It suggests that the professional just like self-employed people can use their professional skill even after retirement. They never retire in the true sense of the term. Specially, those who had been engaged in higher teaching profession, retirement gives them opportunity for further studies and research work. They seldom feel bored.

It is found that more than half of the respondents do not have any complain regarding utilisation of their time (Table 4).

We also learn from the table that the two major activities which fruitfully engage such pensioners are firstly-research-oriented studies and writing and secondly socio-political work.

Most of the professional pensioners have academic background of specializations, such as doctors, teachers, and lawyers. They volunteer their services to infirmaries (applicable to doctors) or actively participate in the adult education campaign (applicable to teachers) or associate themselves with the Legal Aid Societies to uphold the cause of the indigent people who are deprived of their right full claims (applicable to lawyers) their type of activities render them useful to society. 20.42 percent of the pensioners find their solace and satisfaction in utilising their spare-time in extra mundane religious activities or in associating with some allied philanthropic and missionary organisations. 10.23 percent of them do not have any leisure problem at all because they are reappointed in some other organisations after retirement.

So, the Pensioners, discussed above do not have serious leisure problems because they desire satisfactions from other sources.

DESIRED ACTIVITIES OF THE PENSIONERS

In the preceding section reaction about free time and the activities of the pensioners have been discussed. No attempt is made to indicate what they would like to do. Although to some of our respondents there is no difference between the actual situation and the ideal, the majority of the respondents are unhappy with utilisation of their time. There is a gap between what they are doing and what they want to do. Whether or not the pensioners are satisfied with the mode of utilisation of their time, all of them were asked how best they would like to utilise their time – no matter if be more than one way, and the result of the query can be seen in table 5. A considerable number of respondents are eager to be involved in some social work. Perhaps through such activities they can become useful to society and thereby justify their existence.

SUMMARY & SUGGESTIONS

Contrary to common notion about poor physical state and apathy to do constructive work present study reveals that the majority of Calcutta pensioners are healthy & energetic and are eager to keep themselves busy in occupational or voluntary social work. Capability of using leisure hours properly vary according to the occupational categories and educational attainments. But it is largely accepted that lack of opportunity to participate in some useful work make them unhappy. Commitments to some kind of voluntary work make their lives meaningful.

In our country, voluntary social service has not developed as it should have. We can very well think of utilising these experience elderly men who have retired from the race of work-a-day life. They

have knowledge and skill and at the same time selfless dedication. The only reward they would expect for such dedicated service is the recognition that they are still now useful to the society. In this context, we may suggest that it is necessary to introduce pre-retirement planning and learning a secondary occupation so that it may be of use in post-retirement years. It may further be noted that there is no recreational club or day centre in our country where aged can spend their leisure in healthy recreational activities. There is urgent need for such centres which can help them to lead a healthy normal life.

TABLE – 1
Table showing the reasons for boredom of respondents

Reasons	Percentage
1. Poor health condition	20.10
2. Financial constraints	17.51
3. No work	62.39
Total	100.00

N = 106

TABLE – 2
Percentage Distribution of respondents according to their education and feeling about time

Education of respondent	Not feeling bored	Feeling bored	Total
1. Up to middle	77.34	22.66	100.00
2. Middle to Graduation	53.51	46.49	100.00
3. Graduate and above	21.10	78.90	100.00
Total	50.65	49.35	100.00

N = 224

TABLE – 3
Percentage Distribution of respondents according to their occupation and feeling about time

Occupation (last)	Not feeling bored	Feeling bored	Total
I	56.83	43.17	100.00
II	77.57	22.43	100.00
III	46.74	53.26	100.00
IV	22.09	77.91	100.00
Total	50.81	49.19	100.00

N = 224

TABLE – 5
Table showing the desired activity of the respondents

Reasons	Percentage
1. Reading, Writing research work	36.71
2. Religious activity	20.42
3. Socio-political activity	32.64
4. Economic activity	10.23
Total	100.00

N=118

TABLE – 5
Table showing the desired activity of the respondents

Reasons	Percentage
Voluntary or Social work	41.37
Higher academic activities (Reading, Teaching, Guidance to Research)	25.57
Total devotion to God	8.00
Money earning of work	27.81
Visiting places	2.25
Do not know	4.00

N=224

Note: Respondents indicated more than one activity as desired

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NOTES FOR CONTRIBUTORS

All Contributions and correspondence should be sent to Dr. Indrani Chakravarty, Calcutta Metropolitan Institute of Gerontology, E-1, Sopan Kutir, 53B, Dr. S. C. Banerjee Road, Kolkata-700 010. Contributors are requested to conform to the following norms and those articles that do not conform may not be considered.

Journal articles that deal with the biological, medical, psychosocial, service or other aspects of ageing are welcome.

Articles should be original contributions. Redundancy is discouraged. The articles should be written in English, free of grammatical or spelling errors, repetitions etc.

Articles shall contain: A brief introduction (reflecting the context, the review of relevant work and why the present study was planned) : relevant details of plan methodology, sample, (including standardization properties of tools) etc., the results or findings and their discussion and conclusions arrived at. At the beginning of the article the title and names of authors shall be mentioned. (Their affiliation may be given at the bottom of the page). This shall be followed by a brief abstract of the article (not exceeding 100 words) in single space, bold and set off the margins (inset by two spaces). Two or three key words of the article should be provided at the end of the abstract separately.

Articles may be computer generated. Two hard copies, double spaced in A4 size (one side only) with wide margin may be sent. The articles would be adjudicated by referees and the result would be communicated. When the article is accepted contributors are requested to send 2 corrected versions of the article (hard copies) and the same in an electronic version in CD, press ready.

(a) References as below in international style (e.g. journal of Gerontology) arranged in alphabetical order in the Text : (Altekar, 1973, Birren, 1959, Tyson 1983 ....). End list of references:

Baltes, P. B. (1987). Theoretical propositions of life-span developmental psychology: On the dynamics between growth and decline. *Developmental Psychology*, 23,611-626.

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(b) Footnotes should be avoided unless absolutely essential.

(c) Tables and figures should be clearly laid out, typed in standard format, numbered consecutively, and designed to fit on the page of the journal “AGEING & SOCIETY” of CMIG.