Review Article

A Review on Determinants of Depression among Adult Prisoner

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ABSTRACT

Prisoner tend to be marginalized and deprived that it burdens them with psychological trauma, predominantly depression. This review will identify the determinants of depression among adult inmates. Literatures published from 2012 to March 2017 were searched from various databases. Inclusion criteria were English full text, adults with a diagnosis of depression while exclusion criteria were diagnostic instruments, clinical or drug trials. The review adhered to Preferred Reporting Items for Systematic Review and Meta-Analyses: The PRISMA Statement reporting. A total of 168 studies were identified although only 14 studies were eligible for final review. Factors associated with inmates' depression range from the potentially modifiable to non-modifiable. Recognized modifiable factors were psychological, family support, and environment while non-modifiable were biological, demographic, individual, and social. Determinants identified should be addressed in formulation of better targeting therapy, in terms of both prevention and treatment of depression among inmates.

Keywords: Review, Determinants, Depression, Adult, Prisoners

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INTRODUCTION

Prison is an institution created to punish inmates who had run afoul of the law (1) and to reform them into law abiding residents to reduce recidivism (2). However, it was posited that incarceration worsens their physical and mental health problems (2) as prison population comprise some of the most underprivileged and stigmatized individuals in the community. Studies conducted across many countries revealed that the prevalence of mental disorder in prison far surpasses the general population (3). Depression is one of the most common mental health problems among prison population (4). The contributing factors resulting in loss of freedom and opportunities are lack of social support, interpersonal relationship, employment, and social roles. (5). Moreover, the prison environment characterized by overcrowding, stereotype regimen, lack of recreational activities, and high level of uncertainty could lead to depression (6).

The consequences of untreated depression in prison range from severe deterioration of health and resultant disability, to suicide. The need for effective mental health care services for prisoners underscores the importance of epidemiological study to determine the contributing factors of depression. Although depression is common among inmates, there is uncertainty over its etiology and risk factors, which complicates the management. Variations in research methodology have resulted in different contributing factors despite undertaking a considerable body of research. Thus, the aim of this systematic review is to determine the associated factors and predictors of depression among adult prisoners. This review will contribute to filling the gap in the dearth of determinants of depression in prisoners' mental health. Knowledge of the predictors of depression may allow better targeting of therapy, in terms of both prevention and treatment of depression among inmates.

METHODS

Search Strategy

A comprehensive search of literature was performed to identify the relevant studies. Electronic database

was used to identify applicable articles by searching in EBSCOhost medical collections (MEDLINE and CINAHL), PubMed, Science Direct and Wiley Online Library. Furthermore, the relevant reference and citation list was handsearched from PsyINFO, Google Scholar and available local journals in Malaysia. The search term comprised the following combination to capture the target population: 'prisoner' OR 'inmate' OR 'detainee' OR 'incarcerated'. Symptoms of depression terms included: 'depress' OR 'depression' OR 'mood disorder' OR 'psychological distress'. Determinants search terms comprised: 'correlates' OR 'predictors' OR 'associated' OR 'determinants' OR 'prevalence' OR 'risk factors'. Medical Subject Headings (MeSH) terms and free text word suitable to the databases were used. These keywords were selected based on the finding in the majority of papers collected earlier.

Selection Criteria

Inclusion and exclusion criteria were as follows:

Inclusion Criteria

Studies for inclusion in this review were confined to studies in English full text published from 2012 to March 2017. Irrespective of whether cross-sectional, cohort or case control, descriptive or observational studies were also included. Participants were adult prisoners, regardless of sex, who were diagnosed with depression and aged between 18 and 60 years old. The term "inmate" refers to any individual detained in a secured correctional institution (prison or jail) due to criminal activity or after convicted by the court. Diagnosis of depression was based on International Classification of Diseases (7) and the Diagnostic and Statistical Manual of Mental Disorders (8), through a validated questionnaire used during screening or diagnostic test.

Exclusion Criteria

The studies excluded from the review were those related to diagnostic instruments, clinical or pharmacological trial and of other design (qualitative, systematic review, meta-analysis, review articles or case reports). Articles published in other fields apart from healthcare, medical, prison and education journals were also excluded.

Screening and Data Abstraction

The search was conducted electronically according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (9). Articles' citations were organized, downloaded and reviewed in order to record titles and abstracts for retrieval using the EndNOTE database. Access to the article was through the university library system. The title, author,
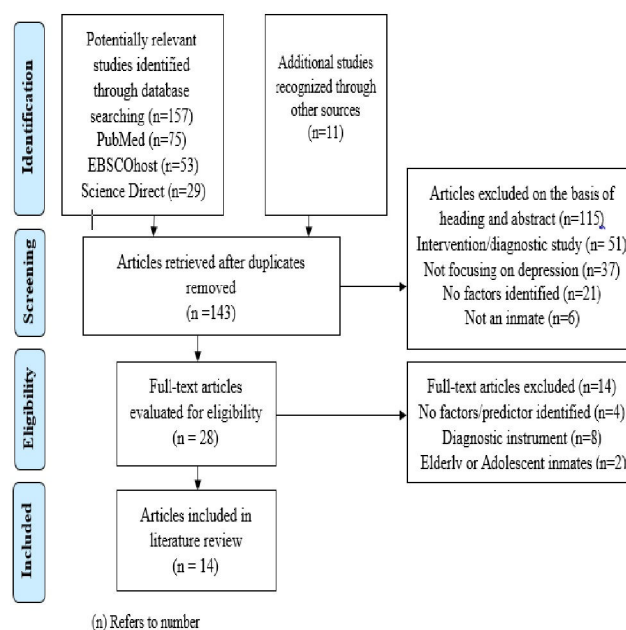
journal and year of publication were then screened for their titles' and abstracts' reviews. Two reviewers independently screened titles and abstracts for eligibility. Any uncertainty in reviewers' decisions was resolved by discussion. Duplicated publications were determined and excluded by comparing author names and article titles. Information was extracted from the review of the articles obtained to cover the authors' name, year of publications, and the country of study. Subsequently, the review noted the study design, the sample size and the results. The results selected to be included in the study must possess an odd ratio and relative risk ratios of 95% CI that do not include 1 or a p value less than 0.05 in order to have a significant factor included.

RESULTS

We identified 168 studies through various database resources as shown in Fig. 1. After eliminating 25 duplicates, 143 articles were retained for review, of which 28 fulfilled the criteria for full text review. However, from the full text review, only 14 studies were entitled for the systematic review as summarized in table 1.

Geographical Locations

We identified publications that reported on depression of adult prisoner in ten different countries, eight of which are classified as low-middle income countries: Ethiopia (3), Nigeria (1, 15-16), India (10, 12), Pakistan (13), Brazil (14), Malaysia (18), Iran (20) and Turkey (21). The remaining two studies were published in high income countries which are United States of America (17) and

Fig. 1. Flowchart of literature search.

Table 1. Factors associated and predictor of depression among adult prisoner

Author/Year/ Location	Study design	Sample Size	Questionnaire	Results	Determinants Factors
Uche & Princewill, (1) 2016 Nigeria	Cross sectional	400	Beck Depression Inventory (BDI)	Past psychiatry history and living in an urban area have an association with depression ($p<0.01$).	1. Psychological 2. Demographic
Datta et al. (10) 2015 India	Cross sectional	404	Hamilton Depression Scale (HDRS)	Age showed significant association with depression ($p<0.05$). Age group 21-30 years mostly depressed (33%). Marital status have an association with depression ($p<0.01$). Those who were married 257 (78.3%) were found to be more depressed compared to unmarried 71 (21.7%).	1. Biological 2. Demographic
Majumdar & Acharya, (11) 2016 India	Cross sectional	60	Depression Anxiety stress Scale (DASS)	Inmates serving two years or lesser were significantly depressed ($\chi^2=20.28$, $p<0.01$) than inmates serving more than 2 years of imprisonment. Prisoner with two years or less imprisonment are more depressed (60%) compared to prisoners more than two years of imprisonment (40%)	1. Individual
Bhuyan & Das (12) 2012 India	Longitudinal	100	Hamilton Depression Rating Scores (HDRS)	Age have a significant association $\{F_{(6,88)}=128.5$, $p<0.01\}$ which age group 18-30 (31%) years old highly depressed compared to others. Sex showed significant difference $\{F_{(2, 94)}=78.6$, $p<0.01\}$ which the severity more in male (77%) compared to female (23%). Significant difference among middle socio economic inmates (51%) $\{F_{(4, 91)}=3.5$, $p<0.05\}$ compared to low (38%) and high (11%) group. Duration of stay associated with depression $\{F_{(2, 94)}=118.5$, $p<0.01\}$. Inmates staying more than six months (66%) are more depressed compared less than six months (34%).	1. Biological 2. Demographic 3. Individual

Author/Year/ Location	Study design	Sample Size	Questionnaire	Results	Determinants Factors
Shahid et al. (13) 2014 Pakistan	Cross sectional	100	Beck Depression Inventory (BDI)	Age found to be significant (p=0.03). Inmates below age 25 years are more depressed. Inmates with chronic disease are more depressed and significantly associated with depression (p<0.01). Inmates educated from grade 1-5 are more depressed compared inmates who received education beyond grade 6, (p<0.01). Inmates with history of childhood sexual abuse are more depressed and there an association with depression (p<0.01). History of childhood labour below age 16 years are associated with depression (p<0.01). Substance abuse showed an association with depression (p<0.01). Previous court cases have an association with depression (p<0.01). Inmates with court cases are more depressed compared inmates without court cases.	1. Biological 2. Demographic 3. Social 4. Individual
Constantino et al. (14) 2016 Brazil	Cross sectional	1573	Beck Depression Inventory (BDI)	Among men there were significant association between depression and age group (p=0.003) and marital status (p=0.028). Male prisoner who sometimes practiced a religion (AOR 2.34, 95%Cl 1.39-3.94, p=0.02) are more probably to have depression compared to those practiced a religion. Among men who maintain normal or weak family ties (AOR 2.46, 95%Cl 1.32-4.57, p<0.05), are more likely to be depressed compared to those who maintain strong family support ties. Stress are significant with depression for both men and women (p<0.05). Among men there was significant association between depression and prison visit (p=0.011). Among men who performed work task in prison (OR 0.49, 95%Cl 0.28-0.87, p=0.028) are less likely to be depressed compared to those don't perform.	1. Biological 2. Demographic 3. Psychological 4. Family support 5. Biological 6. Environment

Author/Year/ Location	Study design	Sample Size	Questionnaire	Results	Determinants Factors
Osasona & Koleoso, (15) 2015 Nigeria	Cross sectional	252	Hospital Anxiety and Depression Scale (HADS)	Age have an association with depression (χ^2 (4) = 10.3, p=0.04). Marital status statistically significant with depression (χ^2(3)= 11.49, p=0.01). Prisoners with poor self-reported current mental health are more likely to be in depression (OR 9.611, 95%Cl 3.252-28.392) compared with prisoners with good current mental health. Previous mental health have an association with depression (χ^2(1) =16.52, p<0.01). Prison accommodation are statistically significant with depression (χ^2 (2) = 13.24, p<0.01). Prison mean (feeding) have a statistic association with depression (χ^2(2) = 24.40, p<0.01). Prison medical services are statistically significant with depression have an association with depression (χ^2 (4) = 10.3, p=0.04).	1. Biological 2. Demographic 3. Psychological 4. Environment
Balogun & Olawoye, (16) 2013 Nigeria.	Cross sectional	233	Self-Rating Depression Scale (SDS)	Emotional intelligence [F (1, 229) = 13.45; p< 0.05] and self-esteem [F (1,211) = 11.34, p<0.05] had a significant influence on depression.	1. Psychological
Holliday et al. (17) 2016 United States of America	Cross sectional	203	Patient Health Questionnaire-9 (PHQ-9)	Substance use have was a substantial predictor of depression, together with alcohol (p=0.03), hallucinogens (p=0.021), and ecstasy (p=0 .05).	1. Social
Ahmad & Mazlan, (18) 2014 Malaysia	Cross sectional	426	The Center for Epidemiologic Studies Depression Scale (CES-D)	There were significant relationship between depression and stress both among male and female inmates (p<0.01). Stress explained 34% in depression among male compared to 20% in females inmates	1. Psychological
Fleming et al. (19) 2012 Australia	Cross sectional	146	Health of Prisoner Evaluation (HoPE) Instrument	Gender and having depression reported a significant association, (χ^2 (1) = 13.81, p<0.05).Strong association between non-indigenous prisoners and depression, (χ^2 (1) = 10.22, p<0.05).	1. Biological 2. Demographic
Gharavi et al. (20) 2015 Iran	Cross sectional	300	Beck Depression Inventory (BDI)	There were significant association between withstand punishment and depression (p<0.05).	1. Individual

Author/Year/ Location	Study design	Sample Size	Questionnaire	Results	Determinants Factors
Beyen et al. (3) 2017 Ethiopia	Cross sectional	727	Patient Health Questionnaire-9 (PHQ-9)	Widow inmates (COR=2.75; 95% CI: 1.20, 6.26) are more likely to be in depression paralleled to single inmates. Inmates that not pleased with their daily life before imprisonment were 56% more likely to be depressed when compared to their counterpart (AOR=0.44;95%CI:0.26,0.63). Discrimination due to crime were significantly associated with depression (COR=1.72; 95% CI: 1.25, 2.35) compared to no discrimination. Inmates that don't know of crime (COR=2.78; 95% CI: 1.61, 4.80) were more likely to depressed compared to inmates that doesn't accept their crime. Previous psychiatric problem were significantly associated with depression (COR=2.50; 95% CI: 1.58, 3.94) compared to no previous history. Having family members with mental illness (COR=1.66; 95% CI: 1.05, 2.64) more likely to be depressed compared to their counterpart. Prisoners who assume they would struggle in running life as before after being released were 47% more likely to develop depression when compared to their counterpart (AOR=1.87; 95% CI: 1.30, 2.69). Inmates with the thought of committing suicide more likely to depressed (COR=4.62; 95% CI: 2.92, 7.31) compared to those don't have the thought. The odds of developing depression among inmates who plan to commit suicide were four times more likely (AOR=4.16; 95% CI: 2.56, 6.77) compared to inmates who hadn't plan to commit suicide. Inmates attempted suicide since imprisoned were more likely to be in depression (COR=4.02; 95% CI: 2.37, 6.83) compared to their counterpart. Prisoners with social support were 62% less likely to be depressed paralleled to those who hadn't social support (AOR=0.62; 95% CI: 0.44, 0.89). Location of prisons were significantly associated with depression (p<0.001).	1. Demographic 2. Individual 3. Psychological 4. Individual 5. Family support 6. Environment
Unver et al. (21) 2013 Turkey	Cross sectional	685	Depression Anxiety Stress Scale (DASS)	Inmates subjected to domestic violence in childhood have a significant association with depression (p<0.001)	1. Social

Australia (19). The classification of low-middle and high income country group are based on World Bank Atlas data (37) which compare gross national income (GNI) per capita, in U.S. dollars. High income countries are those country economies with a GNI per capita of $12,236 and more while lesser than that categorized as lower-middle income countries. It is encouraging to compare prisoners by such classification as there was a significant differences in the prevalence of depression in low-middle-income countries (22.5%, 95% CI 10.6-34.4) compared with high-income countries (10.0%, 95% CI 8.7-11.2) as reported by authors Fazel & Seewald (38) in a systematic review and meta-regression analysis of severe mental illness among prisoners worldwide. The higher prevalence of depression among inmates in low- and middle-income countries is notable as rates of imprisonment are rapid in these countries compared to high-income countries (39). Other possible explanation that, there may be the lack of adequate health services concerning mental health as a result of budget constrain particularly concerning marginalized populations such as prisoners (40).

Study Design, Respondents and Questionnaire

All the studies were cross sectional except one in India which was longitudinal (12). The number of respondents varied with 60 prisoners as the smallest sample size which was reported in India (11) and 1573 as the biggest which was carried out in Brazil (14). High respondents in Brazil partially might be contributed by the highest number of prisoners in Brazil. Brazil has the second highest prison population in America after United States during the study which was conducted in 2013 (14). There was 574,027 inmates in Brazil's prison population which correspond to a national incarceration rate of 393.3 per 100,000 population which is almost three times higher compared to United Nations estimates of national population level of 144 per 100,000 population (14, 39).

Our review identified seven screening tools in the literature used to screen depression among the prisoners. The most commonly used was Beck Depression Inventory (BDI) which was used in Nigeria (1), Pakistan (13), Brazil (14), and Iran (20). BDI were commonly used probably because it can be viewed as a cost-effective questionnaire for measuring the severity of depression, in addition to high reliability and availability in many different languages (41). Besides that, BDI is the most extensively used self-reporting tool worldwide and easy to administer, with good acceptance by users in the public health domain (42). There were four studies notified in India from this review but uses two different tools which were Hamilton Depression scale (HRDS) (10, 12) and Depression Anxiety Stress Scale (DASS) (11,21). Besides that, Patient Health Questionnaire-9 (PHQ-9) were used in two different prisons in Ethiopia (3) and United States of America (17). Other instrument

used to screen depression were Hospital Anxiety and Depression scale (HADS) in Nigeria (15), The Center for Epidemiologic Studies Depression scale (CES-D) in Malaysia (18), Health of Prisoner Evaluation (HoPE) Instrument in Australia (19), and Self-Rating Depression Scale (SDS) in Nigeria (16). All the screening tool have their own advantages and disadvantages but few thing need to look upon to avoid possible bias. Among them are reported level of accuracy, sensitivity, specificity, validity because of the effects of translation from original language to others, population settings and other cultural aspects (42).

DISCUSSION

This paper was designed to determine the factors associated with depression and the predictors of depression among adult inmates. Different literatures cited in different places proved that the depression related factors are complex. Basically, the determinants can be divided into two main factors, namely the modifiable and non-modifiable factors as summarized in Table 2.

Non-Modifiable Factors

Biological Factors
Biological factors refer to chemical, physical, neurological or genetic conditions associated with dominant causes of human behavior, which are customarily scanned when considering the causes of mental illness (22). Age is a biological component that were found to be significantly associated with depression in several countries. This review discovered that young adult prisoners between the ages of 18 and 30 had higher tendency to suffer from depression compared to other age group as reported in India (10, 12), Pakistan (13), Brazil (14), and Nigeria (15). Studies have proposed that the odds of depression in adult incarcerated group is twenty times more than other age group (54). Other possible reason would be stigmatization, learning of criminal behavior from other elderly prisoners and being a victim of bully by fellow prisoners or prison staffs (54). In contrast, other countries in United States of America (17) and Turkey (21) found that age is not a significant factor of depression. Possible that this young adult prisoner still have close relationships with family members, and feeling accepted appear to be protective factors associated with a lower likelihood of depression.

Sex is observed to be an associated factor to depression, but showed mixed results. A study in Australia (19) specify female prisoners of being more depressed compared to men while findings in India (12) indicated severity of depression is more in male than female participants. Most of the literature have reported that women are at higher risk of depression because of biological reasons, such as hormones and genes but

Table 2. Determinants of depression

Non-modifiable factors	Modifiable factors
Biological Age, sex, no of children, history of chronic disease.	**Psychological** Stress, emotional intelligence, self-esteem, thought or plan of suicide, attempted suicide, self-reported mental health, previous mental health problem, family history of mental illness.
Demographic Marital status, education level, religion, educational attainment, place of living, socio-economic status.	**Family support** Family ties, prison visit, social support.
Social History of childhood sexual abuse, history of childhood labour, childhood domestic violence.	**Environment** Prison accommodation, prison feeding, prison medical services, status of prison, place of prison, work task performed in prison.
Individual Type of imprisonment, type of crime, discrimination, accepted crime, substance use (alcohol, hallucinogens and ecstasy), duration of imprisonment and withstand punishment, previous court cases.	

other psychological and sociocultural influences can make males susceptible to depression too. This includes factors like familial environment, prior depression or anxiety disorders, social roles and cultural norms, life events, vulnerability and coping style, and many others (50).

There only one study that attempted to study relationship between chronic disease and depression. Study in Pakistan (13) reported that inmates with a history of chronic disease as more depressed compared to inmates without any chronic disease. This is not an unusual finding as chronic medical illness is consistently associated with an increased prevalence of depression (51). Prisoners with chronic illnesses must adjust to the demands of the illness itself, as well as to the treatments for their condition. The illness may change the way a person lives and affect a person's psychology which might lead to depression. Prisoner without chronic diseases tend to have better self-confidence and a sense of hope which unlikely for them to be depressed.

Demographic Factors
This review noted that widow inmates were three times (COR=2.75; 95% CI: 1.20, 6.26) more likely to experience depression compared to single inmates in Ethiopia (3). This is possibly because imprisonment incites more emotional, traumatic, anxious, and lonely experience making them feel more depressed compared to single inmates (23). Similarly, study in in India (10), Brazil (14) and Nigeria (15) reported significant relationship between marital status and depression. In contrast, the study by author Holiday at el in United States of America (17) indicated that marital status not

a significant predictor of depression. Probably that inmates in USA have a better social support and coping mechanism compared to other inmates in different countries. Secondly gender role. The study in USA taken into account only male respondents compared to other significant studies which have both male and female prisoners as respondents. A global study on depression by author Albert (49) suggested depression could be influenced by biological sex differences as women more often presenting with internalizing symptoms and men presenting with externalizing symptoms

From a study in Pakistan, author Shahid et al. (13) highlighted the need for education as inmates educated from grade one to five were more depressed compared to inmates who attained education beyond grade six. Lack of education is probably the cause of the inmates' ignorance on the means of securing legal aid that they ended up being incarcerated and depressed (24). However, separate study in Nigeria found that level of education insignificant with depression (15). This supported by a study on the relationship of education to the experience of anxiety and depression among adults in Norway which reported that higher education may lose the protective nature of education at increased depressive symptoms and can be a protective effect against depression (48).

In another study in Brazil, Constantino et al. (14) pointed out the importance of religious practice as male prisoners with occasional religious practice were 2.34 times (AOR 2.34, 95% Cl 1.39-3.94) more likely to experience depression than those with consistent religious practice. In contrast, study in Ethiopia (3) reported religious

practice not significantly associated with depression despite almost half (47.4%) of respondents practice religion always. Religious practice can play a role in preventing depression or leading to greater depression. Certain individuals, religious practice may help to cope better stressful life by giving new meaning and hope in life, which create a supportive environment and lessen risk of depression. But in certain individuals, the same religious practices may increase guilt and lead to depression as people fail to live up to the standards of their religious tradition (25).

Social Factors

Social factors are things that influence individuals' personality, attitudes and lifestyle. History of childhood sexual abuse and childhood labour in Pakistan (13) and childhood domestic violence in Turkish prisoners (21) were the factors associated with depression. This could be due to the relationship between childhood stressful life events (family separation, bitter childhood event, or any abuse) and risk of depression as reported by Wainwright & Surtees (26). The psychological effects during child labour creates hopelessness, shame, guilt, loss of confidence and anxiety which eventually lead to a high risk of depression. Only this two countries studied social factors into depression while other countries not. Possible that child labor continues to be a great concern for this country especially Asian origin countries (27).

Individual Factors

Study findings in Ethiopia reports that inmates who are unaware of the type of crime they committed (COR = 2.78; 95% CI: 1.61, 4.80), and prisoners who believe they will encounter hardship in their life after their release compared to their life before imprisonment (AOR = 1.87; 95% CI: 1.30, 2.69) are more likely to be depressed compared to their counterparts (3). This is possibly because they are stigmatized with the offence they committed previously and are worried about their future life. Other studies from different countries don't report on type of crime and prisoner's belief related to depression.

There only two studies reported on association between substance use and depression. Study in Pakistan (13) concluded that history of substance use significantly associated with depression. Similarly, study in USA (17) reported that substance use, together with alcohol, hallucinogens and ecstasy as a predictor of depression. This could be contributed by the strong relationship between emotional discomfort, negative affect and craving of substance use during relapse in prison that worsens depression (28).

This review suggest that duration of imprisonment both in India (11, 12) and withstanding punishment in a study in Iran (20) contribute to depression. However, it varies according to the duration of stay and punishment.

Similarly, previous court cases are found to have an association with depression in which inmates with court cases are more depressed compared to inmates without court cases in Pakistan (13). This contributed by the prison environment which can be unbearable to certain individuals and trigger depression symptoms especially recidivists with pending court cases (29). Pending court cases could stressful period as apart from prison adverse environment inmates vulnerable to extra stress from high level of uncertainty, proximity of offences, shock of possible sentences, hopelessness and many other which may precipitate depression (15). Other countries study finding didn't taken into account on prisoners' imprisonment duration, punishment and pending cases, so much comparison can't be done.

Modifiable Factors

Psychological Factors

All the studies in this reviews that examined mental health status of either prisoner or family members reported significant association with depression. Inmates with self-reported mental illness are ten times (OR 9.611, 95%Cl 3.252-28.392) more likely to be depressed compared to prisoners with good mental health in Nigeria (15). Similarly, inmates with previous psychiatric problems were 2.5 times more (COR = 2.50; 95% CI: 1.58, 3.94) probable to be depressed compared to those with no previous history of psychiatric problems in Ethiopia (3). This finding may be partly due to the unavailability of mental health and rehabilitation services in prison and partly due to the lack of co-ordination in the prison to provide appropriate health care services to the prisoners (52).

Likewise, prison study also reported that inmates having family members with mental illness are two times more likely (COR = 1.66; 95% CI: 1.05, 2.64) to be depressed compared to their counterpart in Ethiopia (3). This is supported by a study by Zubenko et al. (30) who reported that prevalence rates of depression were almost eight times higher in first-degree relatives and four times higher in extended relatives than would be expected based on epidemiological prevalence rates.

The thought of committing suicide (COR = 4.62; 95% CI: 2.92, 7.31), plan to commit suicide (AOR = 4.16; 95% CI: 2.56, 6.77) and attempted suicide (COR = 4.02; 95% CI: 2.37, 6.83) are among the strongest predictors of depression reported in Ethiopia (3). Possible explanation for this predictors are separation from the family, the guilt of the crime, violence in the prison, and an inability to cope with the prison environment, which leads to depression, hopelessness and suicidal ideation (43). This is in line with the American psychological report that suggested depression mitigates the risk of suicidal ideation, suicidal attempt and death by complete suicide (8). Other studies don't have a significant findings possibly that they have better health services that

prevent or treat depression at early stage. Thus, suicidal ideation in individuals suffering from depression should be examined carefully, and adequate mental health services should be provided in prisons (44).

In a sole study in Malaysia, stress was found to have an association with depression in which 70% of female inmates indicated high level for stress and were positively screened with depression compared to only 20% of male inmates (18). This shows that women are more susceptible towards stressful life, in which the common sources are socioeconomic problems, family affairs, and educational restraints (31) as a result of being imprisoned and restricted from freedom (32). Other possible factors that facilitate the onset of stress are unsuitable environments, overcrowding, poor diet, sedentary lifestyle, and social relationships formed by inmates (18). In contrast, other studies in India (11) and Brazil (14) concluded that stress not a significant predictor. Possibly that stress is depend on individual coping strategy that some inmates know how to reduce stress and manage the symptoms by simple physical activities, mind-body practices like breathing exercises, yoga and meditation or other relaxation activity which can be done individually (45).

Meanwhile, a study in Nigeria reveals that emotional intelligence (EI) and self-esteem have an association with depression (16). Inmates with high EI have the capability to regulate emotions to promote emotional growth while those with high self-esteem are inclined to believe in themselves and have a low depression level (33). Among the plausible explanation for these findings that prison inmates who high EI may enjoy better life and be less depressed than those with low level of EI. This because they have the ability to understand and manage their emotion in a more productive ways that solve problem like depression (46). They always sees things in a positive way and have a strong belief that they can adopt to any situation or prison environment. Literature also proposed that individual with high self-esteem are presumed to be psychologically happy and healthy whereas those with low self-esteem are believed to be psychologically depressed (47).

Family Support

Male inmates who cultivated normal or weak family ties were 2.5 times (AOR 2.46, 95% Cl 1.32-4.57) more likely to be depressed compared to those with strong family support in a study in Brazil (14). This can be explained by the fact that prisoners with strong family support tend to forget the negative aspects of their lives, thinking more positively about their environment and have better depression coping mechanism that reduces depressive symptoms (53). Prisoners with weak family tend to have isolated feeling, struggling to connect themselves with prison environment and still searching for a solution in life that make them more depressed. The same study in

Brazil (14) noted that among men there was a significant association between depression and prison visit. This support the fact that although intimate visits to prison is difficult, visits by family, peer, religious and professional links can act as positive support to depressed inmates (34). In contrast, a study in Ethiopia highlights that prisoners who received social support were 62% less likely to be depressed compared to those who received no such support (3). Similarly, study in Nigeria (15) indicated that level of social support insignificant to depression despite 21.8% received good and 32.1% received fair support. This is consistent with the findings by Stice et al. (35) who suggested that manifestation of social support as a protective factor of depression.

Environment Factors

A sole study in Ethiopia prison (3) attempted to study relationship between discrimination and depression and reported that detainees who are discriminated due to crime are two times (COR = 1.72; 95% CI: 1.25, 2.35) more likely to show signs of depression in Ethiopia. Probably that country like Ethiopia still struggling with high prevalence of discrimination among their racial minorities and they frustrated with sentences given to them and there limited opportunity to proof their innocence.

Meanwhile male inmates who performed work in prison (OR 0.49, 95% Cl 0.28-0.87) are less likely to be depressed compared to those who do not perform any work (14). This is possible because prison work is educational and productive that inmates demonstrate fewer symptoms of depression. Important findings drawn from a cross sectional study in Nigeria prison (15) summarized that prison accommodation, feeding and medical services are statistically significant to depression. This might be contributed by the fact that in a third world country like Nigeria, most of the prisons are characterized by overcrowding, stereotype regimen, and scarcity of proper health, sanitation, food and medical facilities (36). More surprising factor associated with depression is the place and status of prison itself. Author Beyen et al. (3) proposed that there is a difference in depression level between inmates from regional prison and inmates from non-regional prison as the regional prison has better facility which could help improve the satisfaction level of the inmates held there.

Limitation

Even though the study described important determinants of depression, the study has its own limitations. Firstly, there is a shortcoming in the search strategy that only literatures in English full text were retrieved. Secondly, only quantitative designs were included. However, we believe that this review has captured most of the factors that contribute towards depression among inmates.

CONCLUSIONS

This paper adds to a growing body of literature on contributing factors of depression among adult inmates. There are many associated factors and predictors identified in this review which were grouped into non-modifiable (biological, demographic, social and individual factors) and modifiable factors (psychological, family support and environment factors). The strongest predictors are practice of religion, family ties, education attainment, number of children, mental health status, and thought, plan and attempt of suicide. The modifiable factors that have been identified to provide input in planning of future mental health intervention policies especially depression among adult inmates. It is recommended that further research is conducted to address and implement a health intervention program that integrates the various factors identified in this systematic review and to study its outcomes.

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DECLARATION

REFERENCES

1.   Uche N, Princewill S. Clinical factors as predictors of depression in a Nigerian prison population. J Psychiatry. 2015;19(01).
2.   Armour C. Mental health in prison: A trauma perspective on importation and deprivation. Int J Criminol Soc Theory. 2012;5(2):886-894.
3.   Beyen TK, Dadi AF, Dachew BA, Muluneh NY, Bisetegn, TA. More than eight in every nineteen inmates were living with depression at prisons of Northwest Amhara regional state, Ethiopia, a cross sectional study design. BMC Psychiatry, 2017;17(1):31.
4.   Kamoyo JM, Barchok HK, Mburugu BM. Effects of imprisonment on depression among female inmates in selected prisons in Kenya. Res Humanities Soc Sci. 2015;5(16).
5.   Butler T, Allnutt S, Cain D, Owens D, Muller C. Mental disorder in the New South Wales prisoner population. Aus N.Z. J Psychiatry. 2005;39(5):407-413.
6.   World Health Organization, WHO. 2007. Health in prisons: A WHO guide to the essentials in prison health. Copenhagen: Organization Regional Office for Europe. [Accessed: 2017 April 21]. Available from: www.euro.who.int/__data/assets/pdf_file/0009/99018/E90174.pdf.
7.   World Health Organization, WHO. 2017. International statistical classification of diseases and related health problems 10th Revision. [Accessed: 2017 May 30]. Available from: http://apps.who.int/classifications/icd10/browse/2016/en.
8.   Heffner LC. Diagnostic and statistical manual of mental disorders, Fourth Edition (DSM-IV) [Internet]. Washington: American Psychological Association; 1994. [Accessed: 2017 Jun 1]. Available from: http://allpsych.com/disorders/dsm.html.
9.   Moher D, Liberati A, Tetzlaff J, Altman, DG, Group, P. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. PLoS Med. 2009;6(7):e1000097.
10. Datta PV, Vijaya M, Krishna IV, Bai BS, Sharon MT, Ramam S. Prevalence of depression and assessment of its severity among prisoners of central prison, Rajahmundry, India. Indo Am J Pharma Res. 2015;5(9):2893-2898.
11. Majumdar MS, Acharya A. Mental health problem among prison population, Udaipur, Tripura. Indian J Appl Res. 2016;6(4).
12. Bhuyan N, Das T. Prevalence of depression among under trial prisoners (UTPS) of Odisha. Indian J Health Wellbeing. 2012;3(2):750-753.
13. Shahid I, Aftab MA, Yousaf Z, Naqvi SH, Hashmi, AM. Prevalence of depression among male prisoners at an urban Jail in Pakistan. HealthMED. 2014;8:699.
14. Constantino P, Assis SGD, Pinto LW. The impact of prisons on the mental health of prisoners in the state of Rio de Janeiro, Brazil. Ciênc Saúde Coletiva. 2016;21(7):2089-2100.
15. Osasona, SO, Koleoso ON. Prevalence and correlates of depression and anxiety disorder in a sample of inmates in a Nigerian prison. Int J Psychiatry Med. 2015;50(2):203-218.
16. Balogun AG, Olawoye PA. Correlates of depression among prison inmates in South-Western Nigeria. Nigerian J Appl Behav Sci. 2013;1(1):43-55.
17. Holliday RC, Braithwaite RL, Yancey E, Akintobi T, Stevens-Watkins D, Smith SL, et al. Substance Use correlates of depression among African American male inmates. J Health Poor Underserved. 2016;27(2A):181.
18. Ahmad A, Mazlan N. Stress and depression: A comparison study between men and women inmates in Peninsular Malaysia. Int J Humanities Soc Sci. 2014; 4(2).
19. Fleming J, Gately N, Kraemer S. Creating HoPE: Mental health in western Australian maximum security prisons. Psychiatry Psychol Law. 2012;19(1):60-74.

20. Gharavi MM, Kashani H, Lotfi M, Borhani M, Akbarzadeh, F. Comparison of depression, anxiety, general mental health and self-esteem among prisoners in consultancy and ordinary wings. J Fundam Mental Health. 2015;17(1):52-57.

21. Unver Y, Yuce M, Bayram N, Bilgel N. Prevalence of depression, anxiety, stress, and anger in Turkish prisoners. J Forensic Sci. 2013;58(5):1210-1218.

22. Nugent, Pam MS. "Biological Factor," in PsychologyDictionary.org, April 7, 2013. [Accessed: 2017 Jun 1]. Available from: https://psychologydictionary.org/biological-factor/

23. Trivedi J, Sareen H, Dhyani, M. Psychological aspects of widowhood and divorce. Mens Sana Monogr. 2009;7(1):37-49.

24. Math S, Murthy P, Parthasarathy R, Kumar C, Madhusudhan S. Minds Imprisoned: Mental Health Care in Prisons. Bangalore, National Institute of Mental Health and Neuro Sciences (Deemed University), 2011.

25. Bonelli R, Dew RE, Koenig HG, Rosmarin DH, Vasegh S. Religious and spiritual factors in depression: review and integration of the research. Depression research and treatment. 2012;2012.

26. Wainwright N, Surtees, P. Childhood adversity, gender and depression over the life- course. J Affect Disord. 2002;72(1):33-44.

27. Srivastava K. Child labour issues and challenges. Industrial psychiatry journal. 2011 Jan;20(1):1.

28. Witkiewitz K, Bowen S. Depression, craving, and substance use following a randomized trial of mindfulness-based relapse prevention. J Consult Clin Psychol. 2010;78(3):362-374.

29. Mansoor M, Perwez SK, Swamy T, Ramaseshan H. A critical review on role of prison environment on stress and psychiatric problems among prisoners. Mediterr J of Soc Sci. 2015;6(1-S1):218-223.

30. Zubenko GS, Zubenko WN, Spiker DG, Giles DE, Kaplan BB. Malignancy of recurrent, early onset major depression: A family study. Am J Med Genet Part A. 2001;105(8):690-699.

31. Reed E, Raj A, Falbo G, Caminha F, Decker, MR, Kaliel, DC, et al. The prevalence of violence and relation to depression and illicit drug use among incarcerated women in Recife, Brazil. Int J Law Psychiatry. 2009;32(5):323-328.

32. Houck KD, Loper AB. The Relationship of Parenting Stress to Adjustment among Mothers in Prison. Am J Orthopsychiatr. 2002;72(4):548.

33. Salovey P, Mayer JD, Goldman SL, Turvey C, Palfai TP. Emotional Attention, Clarity, and Repair: Exploring Emotional Intelligence Using the Trait Meta-Mood Scale. In Pennebaker JW, Editor. Washington: American Psychological Association; 1995.

34. Pinese CS, Furegato AR, Santos JL. Demographic and clinical predictors of depressive s y m p t o m s among incarcerated women. Ann Gen Psychiatry.2010; 9(1):34.

35. Stice E, Ragan J, Randall, P. Prospective relations between social support and depression: differential direction of effects for parent and peer support? J Abnorm Psychol. 2004; 113(1):155.

36. Birmingham L, Mason D, Grubin D. Prevalence of mental disorder in remand prisoners: Consecutive case study. BMJ. 1996; 313(7071):1521-1524.

37. The World Bank. How we classify Countries: Country and Lending Groups. The World Bank, 2018. [Accessed: 2018 February 1]. Available from: https://datahelpdesk. worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups.

38. Fazel S, Seewald K. Severe mental illness in 33 588 prisoners worldwide: systematic review and meta-regression analysis. The British Journal of Psychiatry. 2012 May 1; 200(5):364-73.

39. Walmsley R. World Prison Population List (8th edn). King's College London International Centre for Prison Studies. 2009.

40. Prince M, Patel V, Saxena S, Maj M, Maselko J, Phillips MR, Rahman A. No health without mental health. The lancet. 2007 Sep 8; 370(9590):859-77.

41. Wang YP, Gorenstein C. Psychometric properties of the Beck Depression Inventory-II: a comprehensive review. Revista Brasileira de Psiquiatria. 2013 Dec; 35(4):416-31.

42. Kerr LK, Kerr Jr LD. Culture and Medicine-Screening tools for depression in primary care. WJM-Western Journal of Medicine. 2001; 175(5):349-52.

43. Palmer EJ, Connelly R. Depression, hopelessness and suicide ideation among vulnerable prisoners. Crim Behav Ment Health. 2005; 15(3):164–70. https://doi.org/10.1002/cbm.4.

44. Shrestha G, Yadav DK, Sapkota N, Baral D, Yadav BK, Chakravartty A, Pokharel PK. Depression among inmates in a regional prison of eastern Nepal: a cross-sectional study. BMC psychiatry. 2017 Dec 17(1):348.

45. Mundt C, Reck C, Backenstrass M, Kronmüller K, Fiedler P. Reconfirming the role of life events for the timing of depressive episodes: A two-year prospective follow-up study. Journal of affective disorders. 2000 Jul 1; 59(1):23-30.

46. Carmeli A. The relationship between emotional intelligence and work attitudes, behavior and outcomes: An examination among senior managers. Journal of managerial Psychology. 2003 Dec 1; 18(8):788-813.

47. Tennen H, Affleck G. The puzzles of self-esteem a clinical perspective. InSelf-Esteem 1993 (pp. 241-262). Springer, Boston, MA

48. Bjelland I, Krokstad S, Mykletun A, Dahl AA, Tell GS, Tambs K. Does a higher educational level protect against anxiety and depression? The HUNT

study. Social science & medicine. 2008 Mar 1;66(6):1334-45.

49. Albert PR. Why is depression more prevalent in women?. Journal of psychiatry & neuroscience: JPN. 2015 Jul;40(4):219.

50. Piccinelli M, Wilkinson G. Gender differences in depression: Critical review. The British Journal of Psychiatry. 2000 Dec 1;177(6):486-92.

51. Simon GE. Treating depression in patients with chronic disease. Western Journal of medicine. 2001 Nov;175(5):292.

52. Morgan RD, Flora DB, Kroner DG, Mills JF, Varghese F, Steffan JS. Treating offenders with mental illness: A research synthesis. Law and human behavior. 2012 Feb;36(1):37.

53. Clark CM. Relations between social support and physical health. Rochester Institute of Technology. 2005.

54. Ng IY, Shen X, Sim H, Sarri RC, Stoffregen E, Shook JJ. Incarcerating juveniles in   prisons as a factor in depression. Criminal Behaviour and Mental Health. 2011 Feb 1;21(1):21-34