

Effectiveness of a Combined Depression Literacy and Group-Based Behavioural Therapy Intervention in reducing Depression-Related Stigma Among Elderly Adults in Rural India: A Quasi-Experimental Study

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Abstract

Background:

Depression-related stigma remains a major barrier to mental health care among older adults, particularly in rural settings. Interventions combining mental health literacy and behavioural approaches may reduce stigma and improve knowledge.

Methods:

A quasi-experimental pretest–post-test control-group design was used. Sixty elderly participants (≥ 60 years) with moderate-to-high levels of depression-related stigma were selected through purposive sampling and allocated to an experimental group ($n = 30$) and a control group ($n = 30$). The experimental group received three depression literacy sessions followed by six weekly group-based behavioural therapy sessions. The control group received routine community health education. Depression Stigma Scale (personal and perceived stigma) and the Depression Literacy Questionnaire were used. Paired t -tests, Mann–Whitney U tests, and Chi-square tests were applied. Effect size was calculated using Cohen's d . A p -value < 0.05 was considered statistically significant.

Results:

At baseline, depression-related stigma scores were significantly higher in the experimental group compared to the control group ($p = 0.016$). Following the intervention, the experimental group showed a significant reduction in stigma scores from 39.86 ± 5.42 to 33.94 ± 7.65 ($t(29) = 2.970$, $p = 0.006$), whereas no significant change was observed in the control group ($p = 0.815$). Significant reductions were also observed in personal stigma ($p = 0.008$) and perceived stigma ($p = 0.033$). Depression literacy scores improved significantly in the experimental group from 28.5 ± 8.8 to 35.9 ± 10.5 ($p = 0.007$). The intervention demonstrated a large effect size (Cohen's $d = 0.894$), indicating substantial practical impact.

Conclusion:

The combined depression literacy and group-based behavioural therapy intervention was effective in reducing personal stigma and perceived stigma. This culturally adapted, community-based model is feasible for use in low-resource settings and can be integrated into primary healthcare to improve mental health outcomes in older populations.

Trial Registration

Not applicable (As the ethical approval for our study was obtained more than one year ago. As per the current CTRI guidelines and procedural limitations, retrospective registration is presently not feasible for our study.)

Background

Depression among the elderly is a significant global public health challenge due to its high prevalence, chronicity, and impact on quality of life [1]. In India, where the proportion of older adults is rising rapidly, depression remains underdiagnosed and undertreated due to ageist attitudes, cultural misconceptions, and social isolation [2, 3]. Stigma surrounding mental health conditions, particularly depression, further hinders help-seeking behaviours and adherence to treatment, reinforcing the vicious cycle of suffering in silence [4, 5].

Stigmatising attitudes toward depression further compound this problem. Stigma not only affects participants with depression but also influences families and communities, discouraging disclosure and care-seeking behaviours [6, 7]. Reducing stigma is therefore essential to improving mental health outcomes in elderly populations. Mental health literacy—defined as the knowledge and beliefs that aid in recognising, managing, or preventing mental disorders—plays a crucial role in reducing stigma and promoting early intervention [8]. Educational interventions focused on depression literacy have shown effectiveness in improving awareness and attitudes in various populations [9, 10]. However, such interventions are rarely implemented among older adults in rural Indian settings, where stigma remains deeply rooted [11]. Behavioural therapies, including cognitive-behavioural strategies and behavioural activation, have also been shown to reduce internalised stigma by enhancing self-efficacy and restructuring maladaptive beliefs [12–14]. Recent evidence indicates that integrated approaches combining psychoeducation with behavioural therapy may be especially effective in altering long-standing negative attitudes toward depression [15].

A few community-based studies in India have attempted to improve mental health literacy among older adults, yielding positive results; however, these studies have rarely incorporated behavioural therapy components and often focus on urban settings [16, 17]. Moreover, Khordha district in Odisha, characterised by a mixed rural and semi-urban demographic and limited mental health services, remains under-researched in this context [19, 20]. Implementing culturally appropriate, community-delivered interventions that target both knowledge deficits and behavioural components may offer a scalable strategy to reduce depression-related stigma among the elderly.

Therefore, this study aimed to assess the effect of a combined depression literacy and group-based behavioural therapy intervention on depression-related stigma among elderly participants in rural Odisha.

Methods

Study design and setting

A Quasi-experimental pre-test-post-test control group design was used to assess the effect of a structured intervention on stigma related to depression among elderly participants. The study was conducted from July to October 2023 in two purposively selected villages, Bharatpur and Shampur, located in the rural area of Khordha District, Odisha, India. These villages were chosen for their accessibility to elderly populations.

Participants

The study population comprised participants aged 60 years and above residing in the selected villages. Participants were screened using the Depression Stigma Scale (DSS), and those with moderate to high levels of depression-related stigma were considered eligible.

Inclusion criteria included: (1) age ≥ 60 years, (2) permanent residency in the selected villages, and (3) willingness to provide informed consent. Participants with diagnosed psychiatric disorders, active psychosis, or cognitive impairment were excluded.

A non-probability purposive sampling technique was used to recruit participants. A total of 60 eligible participants were enrolled and allocated into an experimental group ($n = 30$) and a control group ($n = 30$). Allocation was based on village location to minimize contamination between groups.

Sample size

The sample size was calculated using G*Power software (version 3.1.9.7) based on the primary outcome of change in depression-related stigma scores between and within groups. An independent-samples t-test (two-tailed) was used for between-group comparisons, and a paired-samples t-test for within-group comparisons; nonparametric equivalents (Mann–Whitney U test and Wilcoxon signed-rank test) were planned if normality assumptions were violated. The calculation was performed using a medium effect size ($d = 0.5$), an alpha error probability of 0.05, a power of 80%, and an allocation ratio of 1:1, yielding a total sample size of 72 participants (36 per group). As non-parametric tests may require a slightly larger sample, this estimate was considered adequate for both parametric and non-parametric analyses. However, due to logistical and feasibility constraints, 60 participants were enrolled using a non-probability purposive sampling technique, with 30 participants in each group. A post hoc power analysis indicated that the achieved sample size provided approximately 70–75% power to detect a medium effect size, which was considered acceptable for this quasi-experimental study [18], with 30 participants allocated to each of the two groups represented in Figure 1.

Intervention

1. The intervention was a structured, culturally adapted program combining depression literacy education and group-based behavioural therapy, delivered over a period of six weeks. The intervention was grounded in principles of behavioural activation and cognitive-behavioural therapy (CBT), focusing on modifying maladaptive beliefs and promoting adaptive behaviours.

2. Depression Literacy Sessions

Three sessions were conducted during the first week in small groups of 8-10 participants. Sessions covered understanding depression as a medical condition, common signs and symptoms, risk factors, treatment options (medications, counselling, and self-care), the importance of early help-seeking, and challenging myths and misconceptions. Each session lasted 45–60 minutes, was conducted on alternate days, and was interactive using visual aids and printed leaflets. Sessions were delivered in Odia by a trained psychiatric nurse.

3. Behavioural Therapy Sessions

Following the educational sessions, participants attended six weekly behavioural therapy sessions (each 60 minutes long) in small groups of 6–8 participants. Sessions included:

- Week 1: Introduction to behavioural therapy and rapport building.
- Week 2: Identifying negative thoughts and understanding the connection between thoughts, emotions, and behaviours.
- Week 3: Cognitive restructuring and adaptive thinking.
- Week 4: Behavioural activation through pleasurable and meaningful activities.
- Week 5: Coping skills training, including relaxation exercises and guided imagery.
- Week 6: Relapse prevention and maintenance strategies through role-play practice.

Sessions were conducted in a community hall setting in Odia by a trained psychiatric nurse with experience in mental health care. Standardised session plans were followed to ensure consistency across groups.

Participants in the control group received routine community health education provided by local health workers and ASHAs. After post-test data collection, they were offered a single informational session on depression literacy.

Data collection tools

Data were collected using a structured interview schedule comprising three parts:

Socio-demographic questionnaire (7 items) – capturing age, gender, education, marital status, income, and occupation. (Supplementary File 1: Part A- Structured socio-demographic questionnaire)

Depression Stigma Scale (DSS)

The Depression Stigma Scale (DSS), developed by Griffiths et al. [21], was used to assess the stigma associated with depression among the elderly participants. This tool consists of 18 items, divided into two subscales: Personal stigma (9 items), which measures the respondent's own attitudes toward participants with depression. Perceived stigma (9 items), which measures the respondent's perception of others' attitudes toward participants with depression. Each item is rated on a 5-point Likert scale ranging from 0 (strongly disagree) to 4 (strongly agree). Scores are summed separately for each subscale, yielding a possible range of 0 to 36 for both personal and perceived stigma. A higher score indicates greater stigma toward depression. In the present study, the total stigma score was computed by summing the scores of both subscales, resulting in a composite score range of 0 to 72. For interpretation purposes, the following categories were used: 0 – No stigma, 1–18 Mild stigma, 19–36 Moderate stigma, 37–54 Severe stigma, 55–72 Extreme stigma. This classification helped identify the degree of stigmatising attitudes toward depression among elderly participants. The original DSS has demonstrated good psychometric properties, with Cronbach's alpha ranging from 0.76 to 0.82 for the subscales in different population groups [21]. In the present study, the internal consistency reliability (Cronbach's alpha) was found to be 0.81, indicating a high level of reliability. (Refer to Supplementary File 1: Part B- Depression Stigma Scale (DSS)).

Depression Literacy Questionnaire (DLQ)

The Depression Literacy Questionnaire (DLQ), also developed by Griffiths et al. [21], was utilised to assess the level of literacy regarding depression among the participants. The tool consists of 22 items that evaluate knowledge and understanding of the symptoms, causes, treatments, and recognition of depression. Each item is rated on a three-point scale: True, False, Don't know. A correct answer is awarded 1 point, while incorrect or "don't know" responses receive 0 points. The maximum obtainable score is 22, with higher scores indicating a higher level of depression literacy. The DLQ has been extensively used in studies on mental health literacy and has demonstrated satisfactory psychometric properties. In previous research, the DLQ has demonstrated internal consistency reliability with Cronbach's alpha values ranging from 0.70 to 0.78, indicating acceptable reliability across various populations [21].

In the current study, the DLQ was pilot tested among a similar demographic group, yielding a Cronbach's alpha of 0.76, which confirms its adequate internal consistency and suitability for the elderly population under investigation. (Refers to Supplementary File 1: Part C- Depression Literacy Questionnaire (DLQ)).

Both tools were administered in the local language (Odia) after translation and back-translation to ensure conceptual and linguistic equivalence. Content validity was ensured through expert review by mental health professionals and public health researchers.

Data collection procedure

Participants aged 60 years and above were recruited from rural villages in Odisha using a purposive sampling method. Eligibility was determined by moderate to high levels of depression-related stigma on

the Depression Stigma Scale (DSS) during pre-screening. Written informed consent was obtained. Baseline data, including socio-demographic details and DSS scores, were collected via face-to-face interviews in Odia. Data collection occurred in three phases: pre-test, intervention, and post-test. Post-test DSS scores were collected after completion of the intervention for the experimental group and at the same time point for the control group. Interviews were conducted privately to maintain confidentiality and reduce social desirability bias. All data were anonymised, coded, and securely stored for analysis.

Statistical analysis:

Data were entered and coded in Microsoft Excel and analysed using IBM SPSS Statistics Version 26.0. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarise participant characteristics and baseline measures. Before applying inferential tests, normality of continuous variables (stigma and literacy scores) was assessed using the Shapiro–Wilk test. Paired t-test was used for within-group comparisons. Independent t-test was used for between-group comparisons. Mann–Whitney U test was used for non-normally distributed data. Chi-square test or Fisher’s exact test was used for categorical variables. Effect size was calculated using Cohen’s d to determine the magnitude of the intervention effect. Given the non-randomized design and baseline differences between groups, results were interpreted with caution. A two-tailed $p < 0.05$ was considered statistically significant.

Ethical considerations and consent from participants

Ethical approval for the study was obtained from the Institutional Ethics Committee of the Institute of Medical Sciences and SUM Hospital, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India (Approval No: Ref.no/IEC/IMS.SH/SOA/239/2023). Written informed consent was obtained from all participants prior to enrolment in the study. Participants were assured of the confidentiality and anonymity of their responses and were informed of their right to withdraw from the study at any point without any adverse consequences. This study was conducted in accordance with the ethical standards of the Institutional Ethics Committee and the 1964 Declaration of Helsinki, as well as its subsequent amendments, or with comparable ethical standards.

Results

All 60 participants remained in the study through completion of the intervention and follow-up assessments. No attrition was reported, ensuring 100% retention across both experimental and control groups.

Sociodemographic characteristics

Table 1 presents the sociodemographic distribution of participants in both the experimental and control groups. Participants were predominantly in the 65–74-year age range, with comparable age distributions between groups. The mean age in the experimental group was slightly higher (69.23 ± 4.89 years) than in

the control group (68.30 ± 4.65 years). Gender distribution was identical across groups, with 60% of participants being male and 40% female. While both groups reported modest monthly incomes, the control group had a higher proportion of participants in the highest income category, resulting in a higher mean income ($20,160 \pm 3,100$ INR) compared to the experimental group ($17,000 \pm 5,400$ INR).

Table 1
Sociodemographic characteristics of participation in experimental and control group ($n_1 = 30, n_2 = 30$)

Variable	Category	Experimental group f (%)	Control group f (%)
Age (years)	60–64	5(16.7)	7(23.3)
	65–69	11(36.7)	10(33.3)
	70–74	8(26.7)	8(26.7)
	≥ 75	6(20.0)	5(6.7)
	Mean $\pm$ SD	69.23 $\pm$ 4.89	68.30 $\pm$ 4.65
Gender	Male	18(60.0)	18(60.0)
	Female	12(40.0)	12(40.0)
Marital status	Married	27(90.0)	27(90.0)
	Unmarried	3(10.0)	3(10.0)
Type of family	Nuclear	3(10.0)	9(30.0)
	Joint	27(90.0)	21(70.0)
Qualification	Illiterate	15(50.0)	15(50.0)
	Primary education	11(36.7)	11(36.7)
	Higher secondary	4(13.3)	4(13.3)
Occupation	Employed	9(30.0)	6(20.0)
	Not employed	21(70.0)	24(80.0)
Monthly income (INR)	< 10000	4(13.4)	2(6.7)
	10001–20000	10(33.3)	3(10.0)
	> 20000	16(53.3)	25(83.3)
	Mean $\pm$ SD	17,000 $\pm$ 5,400INR	20,160 $\pm$ 3,100INR
<i>M, mean; SD, standard deviation; INR, Indian Rupee.</i>			

Baseline comparison of depression-related stigma

Baseline depression-related stigma scores for the experimental and control groups are presented in Table 2. The experimental group demonstrated higher stigma scores (mean $\pm$ SD: 39.9 $\pm$ 7.85) compared to the control group (30.3 $\pm$ 10.04). Median values showed a similar trend.

Table 2
Baseline comparison of Depression-Related Stigma among participants ($n_1 = 30$, $n_2 = 30$)

Descriptive Statistics	Experimental Group (n ₁ = 30)	Control Group (n ₂ = 30)
Mean (SD)	39.9 (7.85)	30.3 (10.04)
Median	39.6	29.9
Minimum	26.4	16.7
Maximum	54.2	47.2
Mann–Whitney U (<i>p-value</i>)	614.0 (<i>p</i> = 0.016)	
<i>p-value</i> ≤ 0.05 was considered statistically significant.		

As the data were not normally distributed (Shapiro–Wilk test, $p < 0.05$), the Mann–Whitney U test was applied. A statistically significant difference was observed between the groups at baseline ($U = 614.0$, $p = 0.016$), indicating higher levels of depression-related stigma in the experimental group prior to the intervention.

Association between stigma and sociodemographic variables

Table 3 shows the association between depression-related stigma and various socio-demographic characteristics. No statistically significant associations were found between levels of depression-related stigma and age group, gender, marital status, type of family, qualification, occupation, or monthly income (all $p > 0.05$). Although the type of family ($\chi^2 = 3.750$, $p = 0.053$) and monthly income ($\chi^2 = 6.945$, $p = 0.074$) approached significance, these results did not meet the conventional threshold for statistical significance. This suggests that, in these participants, socio-demographic characteristics were not significantly associated with levels of depression-related stigma.

Table 3
Association between Depression-Related Stigma and Socio-Demographic Variables ($n_1 = 30$, $n_2 = 30$)

Socio-demographic variables	Chi-square (χ^2)	df	<i>p-value</i>
Age group	0.472	3	0.925
Gender	0.000	1	1.000
Marital status	0.000	1	1.000
Type of family	3.750	1	0.053
Qualification	0.000	1	1.000
Occupation	0.800	1	0.371
Monthly income	6.945	1	0.074
χ^2 , Chi-square statistic; <i>df</i> , degrees of freedom.			
<i>p-value</i> ≤ 0.05 was considered statistically significant.			

Effect of intervention on depression literacy

Table 4 presents the depression literacy scores for the experimental group before and after the intervention. The mean pre-test score was 28.5 (SD = 8.8), which increased to 35.9 (SD = 10.5) in the post-test. The paired t-test revealed a statistically significant improvement ($p = 0.007$). This indicates that the depression literacy sessions effectively enhanced participants' knowledge about depression, which may have contributed to the observed reduction in stigma.

Table 4
Depression literacy scores before and after intervention in the experimental group ($n_1 = 30$)

Test Time	Mean $\pm$ SD	Paired t-test	P -value
Pre-test	28.5 $\pm$ 8.8	2.960	0.007
Post-test	35.9 $\pm$ 10.5		
<i>p-value</i> ≤ 0.05 was considered statistically significant.			

Effect of intervention on depression-related stigma

Table 5 compares the pre- and post-test depression-related stigma scores in both the experimental and control groups. The experimental group showed a statistically significant decrease in stigma scores from pre-test (M = 39.86, SD = 5.42) to post-test (M = 33.94, SD = 7.65), $t(29) = 2.970$, $p = 0.006$. In contrast, the control group showed no significant change (pre-test: M = 30.28, SD = 8.10; post-test: M = 30.00, SD = 8.77; $p = 0.815$). The effect size analysis demonstrated a large effect in the experimental

group (Cohen's $d = 0.894$), indicating a substantial practical impact of the intervention, whereas the control group showed a negligible effect size ($d = 0.033$).

Table 5
Effect of intervention on depression-related stigma among participants ($n = 60$)

Group	Stigma Domain	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	t-value	df	p-value	Cohen's d
Experimental ($n = 30$)	Personal stigma	39.7 $\pm$ 8.3	33.2 $\pm$ 9.7	—	29	0.008	
	Perceived stigma	40.0 $\pm$ 6.7	34.6 $\pm$ 9.7	—	29	0.033	
	Overall stigma	39.86 $\pm$ 5.42	33.94 $\pm$ 7.65	2.970	29	0.006	0.894
Control ($n = 30$)	Overall stigma	30.28 $\pm$ 8.10	30.00 $\pm$ 8.77	0.236	29	0.815	0.033
A paired t-test was applied within each group. $p\text{-value} \leq 0.05$ was considered statistically significant.							

These findings collectively indicate that the combined depression literacy and behavioural therapy intervention was effective in improving depression-related knowledge and significantly reducing stigma among elderly participants in the experimental group, while no change was observed in the control group.

Discussion

This quasi-experimental research showed that a depression literacy and behavioural therapy intervention resulted in substantial personal and perceived stigma and significant gains in depression literacy levels among older adults in rural Odisha. The control group did not see these changes and the large effect size (Cohen $d = 0.894$) indicates that the changes are statistically and practically significant.

The present study results are in line with the existing literature indicating that multi-component interventions which incorporate psychoeducational and cognitive-behavioural interventions can be used effectively in minimising long-standing stigmatising beliefs in older adults. For instance, community-based anti-stigma interventions with task-shifted care proved to be effective in rural India, as the SMART Mental Health programme showed that such an approach can substantially enhance mental health outcomes [22–24]. Community-based research that has included depression literacy and behavioural activation interventions have also shown the same kind of improvements to stigma reduction and knowledge improvement in the elderly population [25–27]. This study has observed an improvement in the depression literacy, which supports the Mental Health Literacy framework by Anthony F. Jorm which argues that the higher the knowledge, the more the recognition, decrease in misconception and proper help-seeking behaviours [26, 27]. The educational materials provided using culturally adapted materials

in the local language might also have improved the understanding of the participants and helped to reduce negative beliefs and stigma [25].

The large effect size in this study is consistent with the results of meta-analyses of behavioural activation and psychoeducational interventions in older adults, which also show a moderate to large effect size on mental health outcomes [5, 28, 29]. For example, a meta-analysis of behavioural activation interventions found a pool standardized mean difference that showed significant depressive symptom reductions in older adults [5]. There were no statistically significant correlations between stigma and socio-demographic variables but factors like family type and income were close to significant. This observation is aligned with the existing literature that indicates that although socio-demographic factors might be involved in determining mental health outcomes, more engrained cultural beliefs and social norms tend to assert more control over the determinants of stigma, especially in rural areas [16, 17, 30]. The results of this research paper underscore the significance of contextualized and scaled interventions to mental health stigma in low-resource environments. The combination of culturally customized psychoeducation and group-based behavioural interventions, provided by trained health workers is a viable and workable intervention that can be implemented in primary healthcare systems [22–24, 31]. These approaches are especially pertinent when it comes to resolving the critical mental health treatment gap in India, particularly in older adults in rural settings [31]. However, such results are to be perceived within the frames of some limitations. The selection bias could have been caused by the fact that there were differences in baseline stigma scores between the experimental and control groups. Also, the quasi-experimental study design and non-probability sampling restrict causation and extrapolation. The time of follow up is also rather limited to make conclusions about the long-term sustainability of the effects of the interventions. To confirm and reinforce these findings, future studies need to include randomized controlled designs and bigger sample sizes as well as longer follow-ups. It is also justified to conduct further research on how such interventions can be incorporated into mainstream community health services. To sum up, the research is relevant to the existing literature on the effectiveness of integrated depression literacy and behavioural interventions in the reduction of stigma and enhancement of mental health literacy among older adults in underserved rural areas [27, 29].

The findings highlight the importance of policy-level approaches to integrate such interventions into community-based mental health programmes in order to resolve the current treatment gap.

Implications for practices

The findings of this study highlight that culturally adapted, depression literacy-based, and behavioural interventions can be effectively integrated into community mental health programs to reduce stigma among elderly populations in rural settings. Training nurses, community health workers, and ASHAs to deliver interactive, small-group sessions in the local language can enhance comprehension, engagement, and adoption of positive behavioural changes. This intervention model may also serve as a

framework for developing similar programs targeting other mental health conditions in low-resource communities, supporting wider public health impact.

Strength and Limitations

This research has a number of strengths. It used in a community-based quasi-experimental design which helps to increase its applicability to real-life situations in public health. The reliability and comparability of the results are enhanced by the use of standardized and validated measures, i.e. the Depression Stigma Scale (DSS) and Depression Literacy Questionnaire (DLQ). The intervention was a combination of a depression literacy and group based behavioural therapy and offered a holistic and culturally modified intervention that would consider both the knowledge and behavioural aspects of stigma. Also, the intervention was presented in the local language via a structured protocol, thus making it consistent and possible to implement in other low-resource environments.

This research also has a number of limitations. The use of purposive sampling and a relatively small sample size limits the generalizability of the findings. The limitation to the assessment of the long-term sustainability of the intervention effects is the short-term follow-up period. There is a possibility of social desirability bias since self-reported instruments would be used, although this is mitigated by using private interviews. Moreover, there was a significant difference in baseline depression-related stigma scores between the experimental and control groups, which could have led to selection bias and should be taken into account when interpreting the effects of intervention. Lastly, it is important to note that the study was carried out in the rural Odisha setting and this might not be applicable in other areas or among different age groups.

Conclusion

This study demonstrates that a culturally adapted, depression literacy-based, and behavioural intervention may help to reduce stigma related to depression among elderly participants in rural India. These findings indicating that such interventions could be considered within community-based mental health programs, particularly in low-resource settings. However, the results should be interpreted in light of the study limitations, including the quasi-experimental design and limited generalizability. Future research should employ longitudinal designs, include larger and more diverse populations, and assess additional psychosocial outcomes to further validate and expand the application of this intervention approach to a wider public health.

Declarations

Ethical Approval and Consent to Participate

Approved by Institutional Ethics Committee with Ref.no/IEC/IMS.SH/SOA/239/2023.

Written informed consent was obtained from all participants prior to their inclusion in the study. The purpose, procedures, potential risks, and benefits of the research were clearly explained in the local

language (Odia), ensuring participants understood and voluntarily participated. All participants were informed of their right to withdraw from the study at any time without penalty. As the study involved older adults, particular care was taken to ensure there was no coercion, and participation was entirely voluntary. No personally identifiable or biometric data were collected or disclosed. Documentary evidence of consent is available and can be provided upon request.

Consent for publication

Not applicable

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Authors' Contributions

SS, PM, TS, SS: Conceptualisation, methodology, intervention design, data collection, and manuscript drafting. PM, SS, KP, PT: Data analysis, results interpretation, and critical review of the manuscript. PT, PM: Supervision, manuscript editing, and approval of the final version. All authors read and approved the final manuscript.

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Availability of data

The datasets generated and analysed during the current study are available from the corresponding author on reasonable request.

Competing Interest

None declared

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Figures

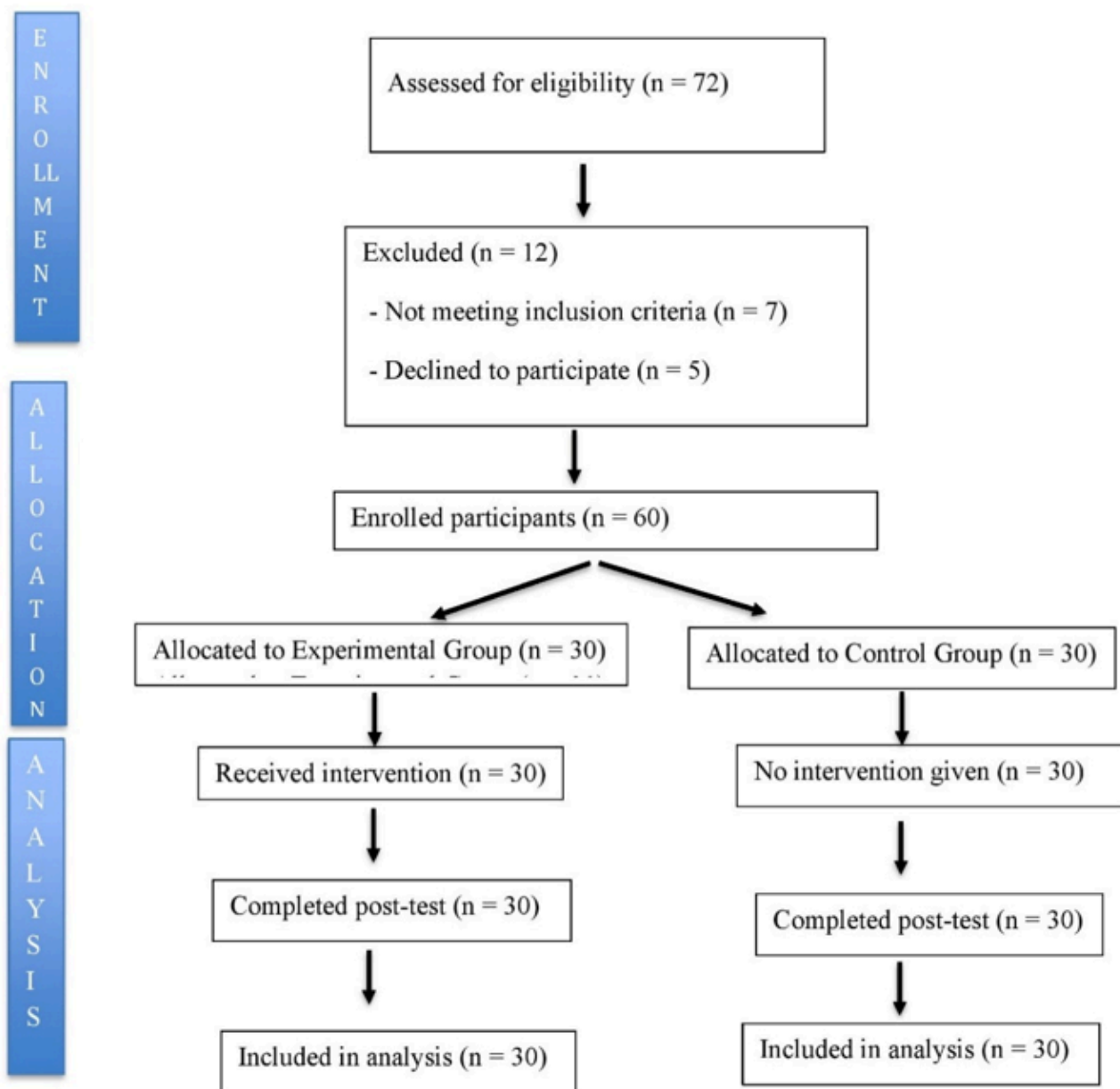


Figure 1. Participant Recruitment CONSORT- Flow Diagram

Figure 1

Participant Recruitment Flow Diagram

Flow diagram illustrating the recruitment, allocation, and analysis of participants in the quasi-experimental study conducted in Khordha, Odisha.

Supplementary Files

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