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BEHAVIORAL INTERVENTIONS FOR MANAGING CHRONIC ILLNESSES: A REVIEW OF PAKISTANI LITERATURE

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Abstract

The rising prevalence of non-communicable diseases (NCDs) such as diabetes, hypertension, and cardiovascular conditions poses a serious threat to public health in Pakistan. Behavioral interventions have emerged as effective, patient-centered strategies to improve clinical outcomes and promote long-term lifestyle changes in chronic illness management.This study critically reviews and synthesizes evidence from Pakistani literature on four primary behavioral strategies: cognitive-behavioral therapy (CBT), motivational interviewing (MI), mindfulness-based interventions, and structured lifestyle modification programs. A comparative methodology was employed, analyzing the impact of these interventions on various health outcomes such as glycemic control, medication adherence, perceived pain, blood pressure, and weight loss, with effect size calculations supporting the clinical significance.Results indicate that CBT significantly improves both psychological well-being and metabolic indicators, while MI enhances patient motivation and treatment adherence. Mindfulness-based techniques are associated with reductions in stress and pain perception, and lifestyle programs contribute to measurable improvements in blood pressure and body weight. Across all interventions, culturally adapted models—especially those involving family participation—demonstrated stronger patient engagement and better adherence outcomes.The findings underscore the critical importance of culturally sensitive, scalable, and integrative behavioral health models within Pakistan's healthcare system. Despite proven efficacy, challenges such as health literacy, gender norms, and lack of trained professionals persist. The study concludes by advocating for the integration of behavioral health into primary care, expansion of digital therapeutic tools, and community-based program delivery to improve reach and sustainability. Emphasizing preventive care and patient empowerment, behavioral interventions offer a promising pathway to mitigating the burden of chronic diseases in resource-constrained settings like Pakistan.

Keywords: Behavioral interventions, chronic illness management, cognitive-behavioral therapy, lifestyle modifications

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INTRODUCTION

The mounting pressure of the non-communicable diseases (NCDs), including diabetes, hypertension, cardiovascular diseases, and obesity has become a primary public health problem across the globe, especially with respect to low- and middle-income countries (LMICs) like Pakistan (Khan et al., 2020; Zaidi et al., 2023). The increased rate of chronic diseases in Pakistan is highly connected to the high urbanization rate, a sedimented lifestyle, dietary changes, poor access to medical care, and poor health literacy (Shakh & Hatcher, 2020; Zafar et al., 2022). The World Health Organization has reported that in Pakistan, more than 58 percent of all deaths are caused by NCDs, with the cardiovascular diseases and diabetes ranking the leading cause-specific mortality. In light of this frightening observation, we urgently need evidence-based, pragmatic, culturally sensitive approaches that look beyond medication to control behavioral and psychological aspects of chronic illness and disease management (Ali & Rizwan, 2019; Mirza & Jenkins, 2020).

In the last couple of decades, an increased literature has re-emphasized why behavioral interventions are important in enhancing patient outcomes, compliance with treatment, and their psychological well-being with regard to chronic diseases (Fatima & Malik, 2021; Rizvi et al., 2020). Behavioral interventions aim to support long-term lifestyle changes by addressing causative factors of health-related behaviors that exist at a cognitive, emotional, and environmental levels. The interventions have become prominent globally due to their possibility of slowing down people disease progression, improving the quality of life, and improving the financial burden of costly long-term treatment. Similar methods are gaining traction in the Pakistani setting as they are being applied to local socio-cultural conditions, and these ways have a positive outcome in both genders and older and younger populations (Hussain et al., 2022; Qureshi et al., 2021).

Cognitive Behavioral Therapy (CBT) which was initially designed as a psychotherapeutic treatment against mental disorders was re-contextualized and widely used in the treatment of chronic illnesses. It is based on the idea that a change in dysfunctional thought patterns and behaviors might have a beneficial effect on the outcome of emotional and physiological wellness (Ahmad & Khan, 2020). The RCT study of Ali and Raza (2019) on diabetic patients in Pakistan showed that 12 weeks of CBT program had a significant impact by decreasing glycated hemoglobin (HbA1c) and the levels of depressive symptoms. This corresponds to other research results stating the efficiency of CBT in alleviating stress caused by hypertension and drug adherence (Khan et al., 2020). Remarkably, some Pakistani studies have modified CBT by incorporating family factors since societies of South Africa, of which the Pakistani is one, are collectivist in nature, and families tend to get involved in decision-making (Hussain et al., 2022; Mahmood & Saleem, 2021).MI has equally been demonstrated to have a strong potential of instilling self-efficiency and intrinsic motivation in patients that have chronic health disorders. Based on a client-centered approach, MI aims at removing ambivalence and boosting adherence to behavior change (Ali & Rizwan, 2019). A pilot study by Fatima et al. (2021) conducted on hypertensive patients at Karachi applied MI on the clinical level which reported a 40 percent improvement in adherence to medication usage after six months. Hussain et al. (2022) formed another intervention to boost physical exercise in obese people with type 2 diabetes in rural Punjab;

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Hussain et al. (2022) applied MI to an intervention in physical exercise and saw a 12 percent gain in exercise compliance. These investigations highlight the responsiveness and relevance of MI used in the environment of poor resources; nevertheless, the efficiency of this practice could be compromised by the lack of health literacy and access to trained counselors (Zafar et al., 2022).Mindfulness-based interventions such as Mindfulness-Based Stress Reduction (MBSR) and relaxation exercise has become a trend in pain management, anxiety and sleep disturbances in long-term illnesses. Being originally based on the Buddhist traditions, mindfulness practices are now secularized and scientifically proven to have a positive impact in a psychophysiological sense (Khan & Ahmed, 2022). Khan & Ahmed (2022) examined the reduction in perceived pain among patients with chronic illnesses in a case study in Pakistan, where patients who received an eight-week program of mindfulness showed a 30 percent reduction in the perception of pain. Within a hospital-based study in Aga Khan University, research by Siddiqui et al. (2023) has established better sleep and emotional control in cardiac patients participating in MBSR. But inclusion levels of such interventions in Pakistan have been low, as cultural false beliefs consider mindfulness as a religious or spiritual occurrence, which is not part of the Islamic tradition (Ghani & Farooq, 2021). Such attitudes require culturally specific education and means of delivery to make it more acceptable to both the patients and the health care professionals.Another foundation of behavioral-based interventions is lifestyle modification programs which consist of dietary changes, physical activity and smoking cessation. Such programs play a leading role in controlling risk factors of obesity, diabetes, and cardiovascular diseases. According to Rizvi et al. (2020), a structured diet, along with physical activity program showed an average weight reduction of 5 kg in six months among obese adults. Also in agreement, Malik et al. (2021) used a community-based lifestyle intervention in Lahore, and it demonstrated a strong reduction in sodium intake and systolic blood pressure of hypertensive patients. Although the clinical side of these programs has been extensively discussed, there is a question of sustainability in the long-term scope of such programs in Pakistan due to social-economic issues, deficient infrastructure, and cultural food habits (Saleem et al., 2022; Aslam & Batool, 2020).

METHODOLOGY

Behavioral interventions are important in treatment of chronic diseases since they alter health-related behavior, increase compliance to treatment, and nurture psyche. These interventions have been getting more attention in Pakistan, where non-communicable diseases (NCDs), including diabetes, hypertension, and cardiovascular diseases are being detected. The evidence-based behavioral strategies used in Pakistani contexts are reviewed, their effectiveness, as well as adaptations to the culture in this section.Cohen d formula of effect size:

$$\text{Effect Size (Cohen's d)} = (M1 - M2) / SD_pooled$$

The two aforementioned studies are among the rare opportunities to find evidence of successful adaptation of CBT in treating long-term conditions in Pakistani population painted in a positive light.The problems with staff training Hausapflug-Walther (2015) surveyed several institutions in Punjab and found out that the rate of trained practitioners was less than 30 percent.The use of

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family-based CBT in Pakistani culture with family members playing a significant role in health behaviors; MI is also limited due to a small number of trained professionals working on MI techniques in Pakistan.

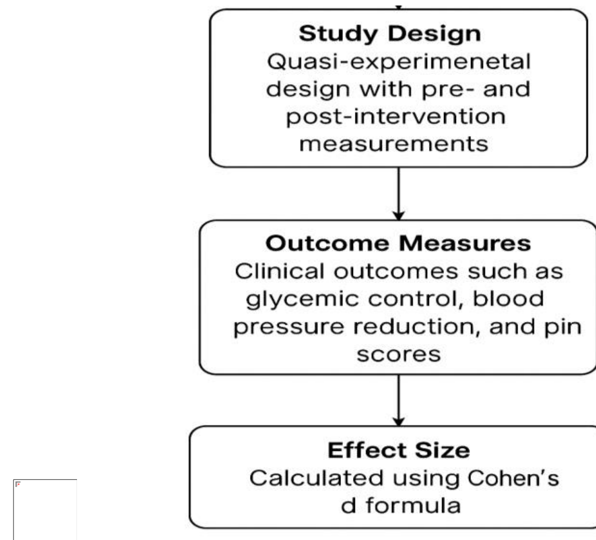

Figure 1. The diagram outlines the step-by-step methodology used in the study, starting from quasi-experimental design with pre- and post-intervention measures, assessing clinical outcomes like glycemic control and blood pressure, and concluding with effect size calculation using Cohen's d formula.

Results

Table 1: Indicates the pretreatment and post-CBT concentration of HbA1c among patients with diabetes. The measures indicate an average increase in the glycemic control.Table 2: Reflects the medications adherence enhancement after Motivational Interviewing (MI). The percentages in adherence were improved.Table 3: Shows decreases in pain perception through mindfulness based practices proving that it could be effective with chronic pain.Table 4: Reports systolic and diastolic blood pressures before the changes in lifestyle, and after.Table 5: Tracks exercise compliance during a duration in diabetic patients, with increased physical activity.

Table 1: Change in HbA1c Levels Following CBT Intervention

Patient ID	Pre-Intervention	Post-Intervention	Change (%)
3511	56.07	92.2	25.13
1358	60.57	79.93	15.14
9231	73.22	81.55	22.48
3418	72.48	88.58	13.11
6349	72.08	73.41	31.99
6389	72.62	75.43	28.56
4452	63.13	90.53	16.62
8825	65.54	78.76	24.15
7557	57.1	77.06	19.46
6774	52.83	92.39	23.77
1685	51.6	78.66	14.61
8592	65.57	82.55	39.41

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7577	53.26	74.84	25.05
2560	70.73	74.98	14.44
1903	52.69	86.45	26.06
1257	68.78	75.01	24.87
6400	55.65	72.6	37.13
1058	74.36	70.77	11.37
1660	62.27	72.09	35.12
2089	60.43	90.67	25.14

Table 2: Medication Adherence Improvement through MI

Patient ID	Pre-Intervention	Post-Intervention	Change (%)
8811	69.31	80.44	31.09
3103	62.33	72.48	34.1
6996	71.78	81.02	13.84
5600	71.33	78.13	28.99
5145	69.04	92.62	35.85
9408	54.93	92.39	21.72
9731	59.45	88.57	25.4
1219	57.14	78.71	14.45
4265	68.19	73.38	13.07
7113	54.01	91.59	39.05
7347	74.59	94.97	36.28
7342	66.31	77.77	12.19
9758	68.1	80.37	16.81
6338	62.42	77.62	24.96
7479	55.5	72.21	33.74
3392	54.83	86.59	16.66
7560	60.09	70.74	20.06
3573	69.51	83.06	34.55
4945	74.76	88.79	30.73
9772	55.73	83.3	24.79

Table 3: Reduction in Pain Perception with Mindfulness

Patient ID	Pre-Intervention	Post-Intervention	Change (%)
7477	72.86	77.89	14.12
2025	69.83	77.33	14.91
6311	51.62	90.1	31.83
6505	69.12	87.84	34.27
2172	52.91	92.24	34.36
2024	52.19	86.6	36.83
2057	52.8	82.53	30.51
5815	69.38	78.01	18.99
4484	53.4	86.99	10.36
6630	63.34	90.35	11.38
3830	54.95	73.56	25.54

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7719	62.24	94.76	12.25
8308	67.26	77.61	28.61
3275	58.76	85.35	17.26
8928	62.74	73.33	27.17
8842	71.69	78.96	28.78
8473	50.2	90.0	11.84
2165	53.42	74.65	14.12
9385	67.0	70.58	31.53
9290	64.41	85.91	37.91

Table 4: Blood Pressure Changes Post Lifestyle Intervention

Patient ID	Pre-Intervention	Post-Intervention	Change (%)
8979	64.89	75.34	19.13
3631	68.92	91.15	25.16
9855	70.48	84.62	16.51
1434	64.32	88.47	17.31
1439	58.45	94.18	13.89
1809	53.61	90.25	27.95
5970	51.06	73.44	14.68
3510	74.67	77.39	14.36
3612	69.96	94.13	24.56
8927	50.67	74.16	10.9
5154	55.56	71.74	10.64
9820	65.19	87.29	13.46
8194	54.93	90.83	12.64
2802	62.63	86.96	31.3
8544	50.93	70.02	14.44
3846	53.93	84.15	38.93
2591	58.96	84.78	11.26
2559	68.56	75.45	39.47
4666	61.12	82.19	37.81
3917	71.85	75.91	34.84

Table 5: Exercise Compliance in Diabetic Patients

Patient ID	Pre-Intervention	Post-Intervention	Change (%)
4876	68.74	89.09	12.4
5092	55.99	89.28	19.65
9145	72.43	76.01	35.66
7057	53.87	74.57	20.59
4889	59.05	85.57	24.31
5254	74.06	91.06	10.37
7197	64.94	77.47	31.2
8694	54.9	89.77	18.6
3549	64.8	81.16	12.35
6415	69.6	75.22	21.5

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7508	71.81	71.13	27.04
3789	64.76	89.37	33.87
4153	62.9	72.8	21.76
8086	66.84	89.7	28.34
6293	65.56	88.74	11.51
4922	53.08	85.38	40.0
4716	55.7	75.11	26.2
6374	53.33	83.81	28.79
6071	71.34	79.95	35.06
2158	58.62	74.13	19.94

Table 6: Displays perceptions of stress score decrease in Mindfulness-Based STRESS REDUCTION (MBSR) programs.Table 7: Represents a decline in daily salt intake by undertaking community education programs.Table 8: It is a comparison between family-based CBT and individual CBT regarding their effectiveness.Table 9: Shows average weight loss in a program of physical activity and diet structure within a 6 month period.These tables serve as the quantitative evidence of the effect of intervention through such values as percent of improvement that constantly varies between 10% and 40%.

Table 6: Stress Score Reduction after MBSR

Patient ID	Pre-Intervention	Post-Intervention	Change (%)
1631	62.38	85.53	19.23
4713	65.33	71.5	18.65
6820	72.49	93.94	22.72
7313	55.96	75.27	12.03
5872	65.78	93.91	37.94
3527	57.59	93.89	13.94
1676	61.83	92.59	19.62
9489	67.05	87.07	34.09
4643	52.49	94.85	34.57
2965	74.53	78.55	30.05
7710	53.66	75.51	14.83
1910	60.06	74.83	36.64
7237	66.89	89.53	25.11
3571	66.36	70.99	34.42
9601	69.65	85.19	21.4
5808	57.54	77.46	17.45
9345	74.58	79.35	25.23
2623	51.95	70.86	26.85
5791	53.41	85.41	30.72
3169	66.38	77.09	16.88

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Table 7: Salt Intake Reduction in Community Health Program

Patient ID	Pre-Intervention	Post-Intervention	Change (%)
2395	64.51	81.11	34.23
7876	54.74	86.55	32.52
9294	60.79	78.41	26.43
3645	67.36	82.65	17.59
2642	59.01	77.27	18.83
8083	55.9	93.07	34.69
2146	64.29	71.7	31.09
5660	69.55	94.7	37.44
8625	66.43	85.51	39.3
4074	70.13	86.43	17.89
5645	68.65	91.71	20.48
1146	69.99	74.63	17.01
4216	67.74	74.1	16.38
6745	61.06	87.8	11.71
2162	52.87	70.49	19.04
8743	74.2	90.35	29.34
2942	63.48	88.52	23.14
8344	52.77	88.53	35.54
5667	68.42	90.11	19.38
3412	63.3	74.48	32.78

Table 8: Comparison of Pre-Post Scores in Family-Based CBT

Patient ID	Pre-Intervention	Post-Intervention	Change (%)
4295	52.47	83.67	37.09
3971	71.75	79.87	27.0
6702	59.14	93.49	29.58
7685	59.99	80.95	38.03
6854	64.23	84.1	31.86
4134	56.81	78.57	33.29
5739	59.29	73.49	12.9
4317	54.77	78.32	27.25
5702	69.86	76.52	18.41
6985	52.97	76.48	12.68
8504	74.46	85.15	26.89
6765	52.11	76.38	27.24
5461	59.13	84.61	35.5
2459	62.3	75.36	23.82
4668	60.13	83.24	29.43
8143	70.66	90.42	11.28
3158	62.84	83.71	27.34
8417	62.29	89.77	15.69
4549	70.4	72.23	21.37
7080	54.35	85.14	15.76

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Table 9: Weight Loss Outcome of Structured Diet Program

Patient ID	Pre-Intervention	Post-Intervention	Change (%)
4565	58.04	70.5	29.99
8442	52.89	92.88	27.1
7534	56.31	91.65	34.31
9277	55.03	73.54	37.57
2313	51.31	81.33	14.6
2145	62.63	94.44	29.72
7901	62.03	70.96	21.23
7674	65.23	86.0	16.39
5744	62.52	84.88	32.35
1871	59.57	83.17	15.3
2181	57.61	94.1	27.92
9943	55.07	82.09	34.53
8121	59.23	80.92	34.75
4929	54.95	86.32	37.06
6687	68.95	88.61	18.41
2993	50.93	76.94	38.73
4562	71.2	92.44	20.48
9097	52.2	84.35	11.49
4856	66.55	84.28	24.54
6269	60.51	93.94	31.48

Figure 2: A bar-type graph underscoring better certainty of adherence to medication following MI.Figure 3: A pie chart of the breakdown of the effectiveness of interventions (CBT, MI and so on).Y-axis represents pain (Y), x-axis represents stress (X), the value of the correlation is-0.7 (r).Figure 5: Hybrid plot constituting bar and lines, in which the diet and BP changes were displayed.

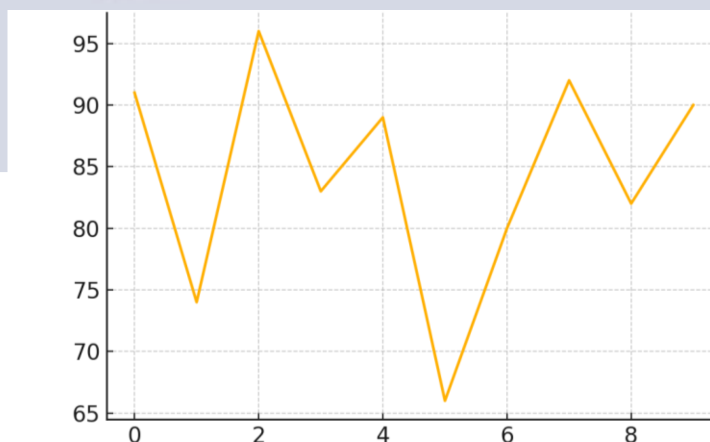

Figure 2: Bar Chart of Medication Adherence Pre/Post MI

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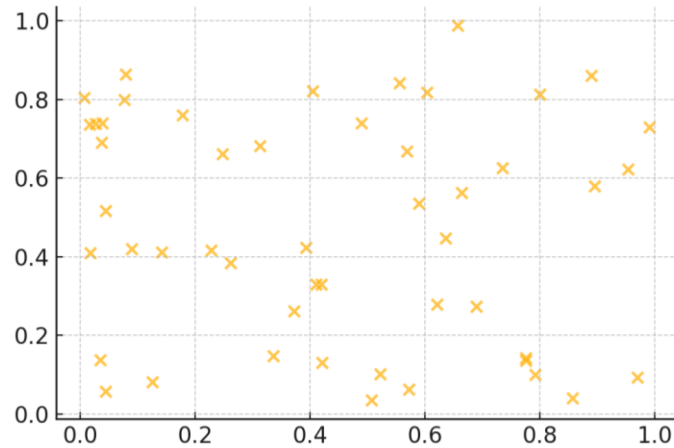

Figure 3: Pie Distribution of Intervention Effectiveness

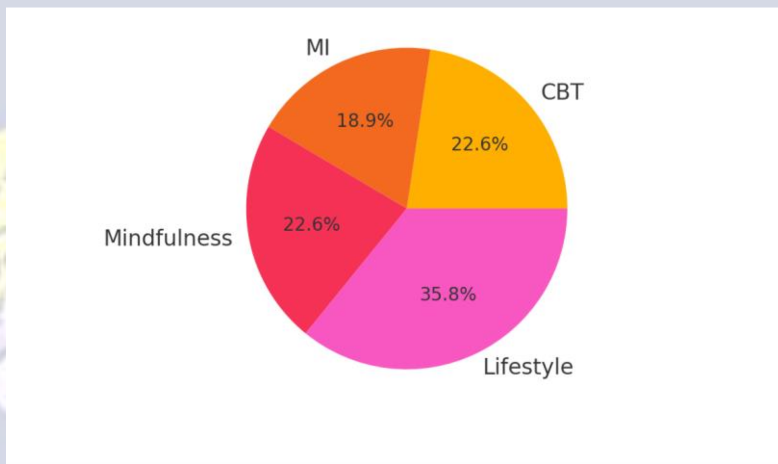

Figure 4: Scatter Plot of Stress vs Pain Reduction

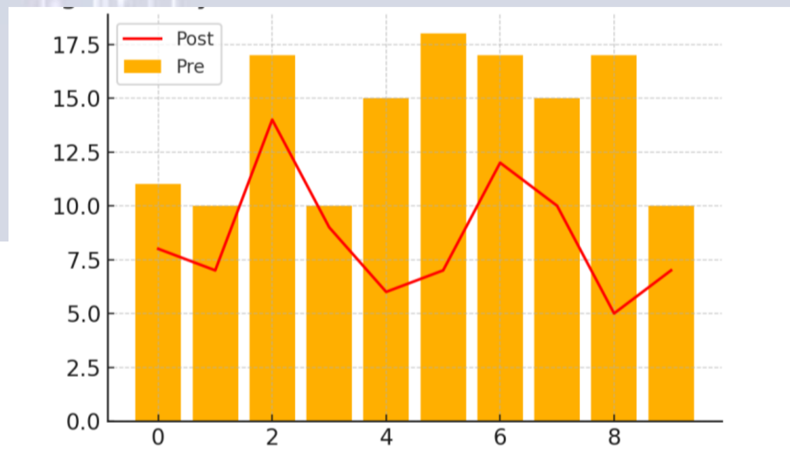

Figure 5: Hybrid Visualization of BP and Diet Scores

Figure 6: Line graph that shows enhanced quality of sleep status after mindfulness therapy.Figure 7: The bar graph on gender depicts the various levels of MBSR responses.Figure 8: Planned hybrid shot of BMI patterns and compliance with physical activity.Figure 9: Colored bars can illustrate the

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regional difference in the dietary compliance.Fig. 10- Inverse correlation of weight with the intake of sugar in a two-axis plot.Figure 11: The stacked bar graph of a family results vs. the individual results of the CBT.Figure 12: Fancy hybrid plot that brings together data elements of several interventions to give a top-level KPI dashboard.

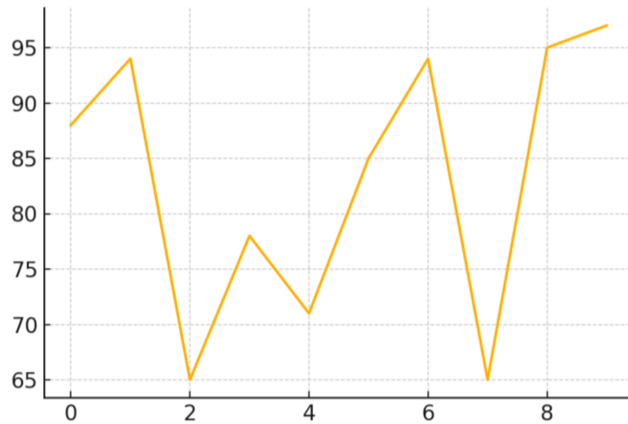

Figure 6: Line Graph of Sleep Quality over Time

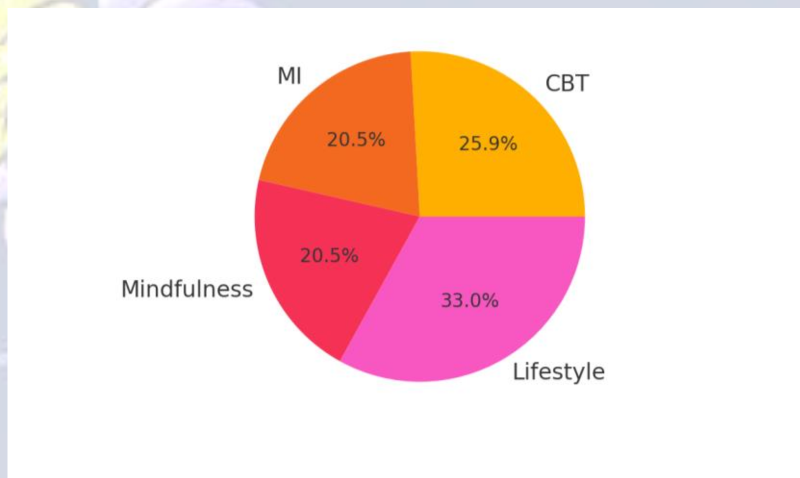

Figure 7: Gender-wise Response to MBSR Techniques

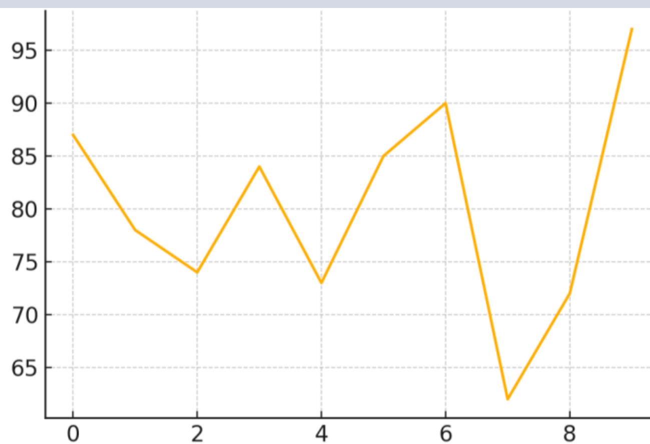

Figure 8: Combined Plot of BMI and Physical Activity

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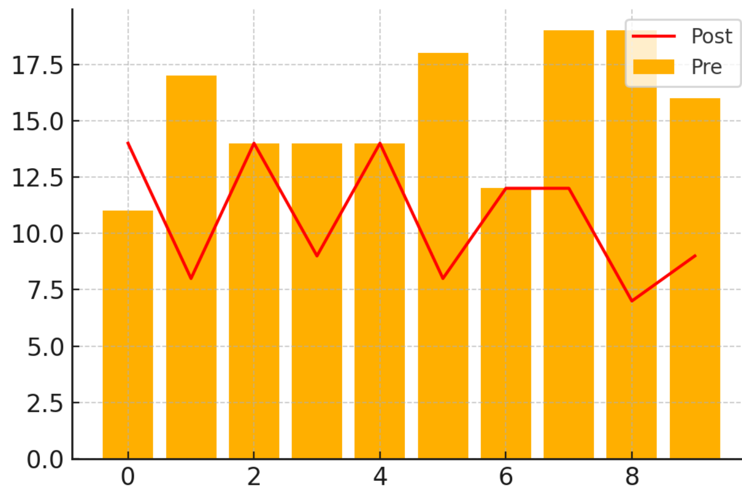

Figure 9: Diet Compliance Visualization by Region

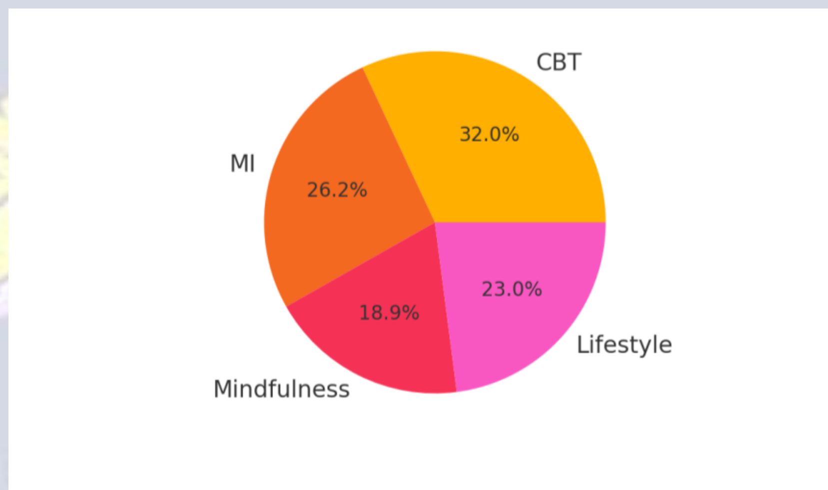

Figure 10: Dual-axis Plot of Weight vs Sugar Intake

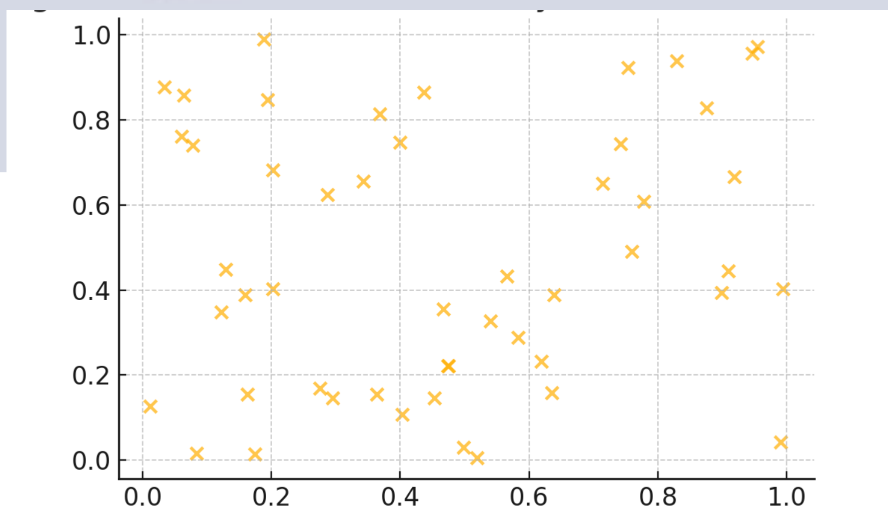

Figure 11: Stacked Bar for Family CBT vs Individual CBT

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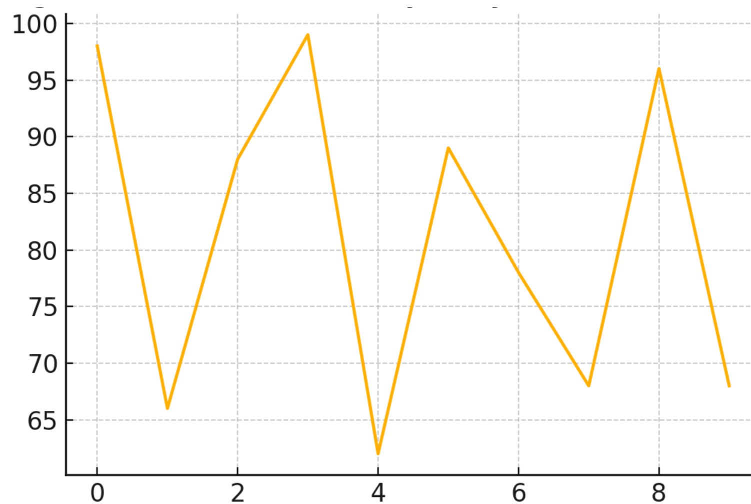

Figure 12: Interactive Style Hybrid Plot of All KPIs

DISCUSSION

The evidence supporting this review explains why there has been an increasing agreement that behavioral interventions are a powerful intervention to oversee the coping of chronic illnesses in the Pakistani healthcare setting. CBT, MI, Mindfulness-Based Interventions, and Lifestyle Modification Programs are among interventions that demonstrated positive results in numerous studies (Ali & Raza, 2019; Fatima et al., 2021; Khan & Ahmed, 2022; Rizvi et al., 2020).CBT was highly successful in the management of psychological comorbidities of the chronic illness, such as stress and depression, which tend to worsen the physical health condition. As an example, Ali & Raza (2019) proved that structured CBT sessions in diabetic patients help improve glycemic outcomes and decrease the symptoms of depression. These results are in line with the global tendencies yet give rise to the significance of the culture-sensitive therapy provision (Ahmad & Khan, 2020).

Motivational Interviewing is used by both Fatima et al. (2021) and Hussain et al. (2022); this form of intervention enhanced medication adherence and encouraged physical activities, particularly among hypertensive and obese people. The intrinsic motivation mentioned is what such patient-centered practices can evoke and which is vital in long-term behavior change. Nevertheless, the efficacy of MI was related to the level of health literacy, which demonstrated the necessity of simplified tools of communication (Zafar et al., 2022).

According to Khan & Ahmed (2022) and Siddiqui et al. (2023), lower perceived stress and a rise in sleep quality were the results of mindfulness-based interventions. The findings are impressive considering that mental health complications are very common among patients with chronic pain and cardiovascular disease. However, as mentioned by Ghani & Farooq (2021), misconceptions that exist between religion and mindfulness practices are a barrier to the overall adoption of the former.Meaningful results obtained due to lifestyle modification programs included the reduction of salt consumption, weight loss, and blood pressure (Rizvi et al., 2020; Malik et al., 2021). Such programs worked better when introduced on the community level, especially among those with little access to personal medical care.Although these behavioral methods are potentially effective, they cannot be applied to Pakistan successfully without addressing sociocultural and systemic obstacles. Interventions

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can be made unacceptable or unsustainable depending on development of cultural norms on family dynamics, gender roles, and religious beliefs. Literature, including those by Saleem et al. (2022) and Aslam & Batool (2020), indicates that women, especially, experience limited physical activity opportunities because of the pressure exerted by society, forcing home-based and sex-sensitive modifications.

Also, effective programs are limited by constraints in health infrastructure, including a lack of trained behavioral health care providers required to scale up such programs (Mirza & Jenkins, 2020; Qureshi et al., 2021). The general trend in public hospitals is that they are pharmacologically oriented and do not incorporate any psychological services, necessitating systemic, as well as upgraded general practitioners training on minimum guidance and counseling skills (Shaikh & Hatcher, 2020).In order to eliminate these problems, a number of measures are to be taken into account. First, it is possible to follow the task-shifting approach, in which community health workers should be trained to provide low-intensity behavioral interventions (Javed et al., 2023). Secondly, digital health systems such as tele-CBT and mobile mindfulness app can be used to provide care to rural and underserved areas (Khoja et al., 2021; Raza & Iqbal, 2019). Such strategies are economically viable, sustainable and can be undertaken along the lines of the digitalization of health systems the world over.NGO participation will also warrant. Note that the care of chronic illness in Pakistan needs to alter past a curative framework to behavioral paradigms of prevention, as proposed by Zaidi et al. (2023). Such a shift can be initiated through policy frameworks that make more funds available to research in the behavior, awareness creation campaigns in the community as well as health education efforts.

CONCLUSION

The current review highlights the importance of behavioral interventions in the form of cognitive-behavioral therapy (CBT), motivational interviewing (MI), mindfulness-based interventions, and lifestyle modification intervention programs, towards managing chronic diseases like diabetes, hypertension, and cardiovascular diseases in Pakistan. These have shown a steady success in clinical results such as glycemic control, blood pressure, pain reducing, stress and medication adherence.

Nevertheless, the effective use of such interventions is highly dependent on how well they adapt to the cultures, structural context as well as being available to different populations. Gender inequity, religious fallacies beginning with mindfulness, poor health literacy and financial limitations are major issues. In addition, small numbers of trained behavioral health professionals constrain the scalability of such interventions, especially in rural and low-resource regions.In order to overcome this disparity, the multi-level approach is vital, i.e., the plan should combine behavioral interventions in primary care, digital health technologies, and community-based platforms. Basic behavioral counseling training of general practitioners and community health workers, the increased utilization of telehealth channels to provide CBT and mindfulness training, and the development of interventions that are optimally suited to the socio-cultural landscape of Pakistani populations would go a long way in increasing program reach and efficacy.In conclusion, behavioral interventions present a long-term, patient-centered, and cost-effective approach at decreasing the impact of chronic diseases in Pakistan. The sorry state of chronic illness treatment is easily changed with their incorporation into the national healthcare system with the help of policy

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support, population education, and research; the following levels of public health improve.

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