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Comparative Analysis of the Effectiveness of the Conventional Treatment versus Ibuprofen and Omega-3 fatty acids in the Management of Patients with Temporomandibular Joint Disorder.

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ABSTRACT:

INTRODUCTION: Dentofacial diseases that can result from extra- or intraarticular disease are known as temporomandibular joint disorders (TMD). Steroids, muscle relaxants, and non-steroidal anti-inflammatory medicines (NSAIDs) are among the medications used to treat TMD. To lessen symptoms and delay the disease's evolution into a chronic illness, many of these medications are used in combination.

AIMS and OBJECTIVES: This study aims to compare the effect of conventional treatment (ibuprofen) with ibuprofen+ omega 3 in the treatment of temporomandibular joint disorder.

METHODOLOGY: Double blind randomized control trial was carried out on TMJ patients who attended the oral medicine and outpatient departments of Peshawar Dental College (PDC) and Khyber College of Dentistry (KCD). Total 116 patients were randomly allocated into two groups, each group having 58 patients. The Numerical Rating Scale (NRS) for pain was one of the self-structured questionnaires used to gather the data. Prior to the start of the treatment, the pain was noted on day 0. In control group i.e conventional treatment group 400 mg of ibuprofen BD was administered to the patients. Whereas Ibuprofen 400mg BD along with omega 3 1000mg OD was given to the experimental group. The medications were given to the subjects of both groups for a total of thirty (30) days. After 7, 15, and 30 days, the patients were recalled to evaluate their response to the medications. The statistical analysis was conducted using the Mann Whitney U test.

Results: At the end of the trial comprehensive relief from various types of severe pain was observed in both groups, but experimental group (Ibuprofen + Omega 3) attained this target prior to control group (Ibuprofen alone).

Conclusion: It was concluded that ibuprofen along with omega 3 is bet conventional treatment in relieving pain related with temporomandibul disorder.

Keywords- temporomandibular joint disorder, dentofacial illnesses, ibuprofen.

INTRODUCTION:

The temporomandibular joint (TMJ) joins the temporal bones of the skull to each side of the jaw bone in a manner similar to a sliding hinge. To facilitate jaw movement, shock-absorbing disks and cartilage separate the bones and joint effortlessly (Segù, 2022). Malocclusion, persistent facial pain, and changes in dentition are recognized side effects of long-term TMJ dysfunction. In order to reduce these problems, a multidisciplinary pain team can be established (Wu et al., 2021).

The fundamental etiology of myofascial pain (MFP) and temporomandibular and its contributing factors have been a subject of discussion for over forty years. (Suvinen TI et al.,1997, McNeill C., 1997).There are several potential causes of the disorder, including neurological, biomechanical, neuromuscular, and biopsychosocial aspects (Jahromi, Pirvulescu, Candido, & Knezevic, 2021).Predisposing factors in the development of TMD may include metabolic, structural, or psychologic aspects; trauma or repetitive adverse loading of the masticatory system; or aggravating factors such as psychosocial, hormonal, or parafunction (Razavi, Ghasemzadeh Rahbardar, & Hosseinzadeh, 2021). In the field of dentistry, there is ongoing discussion over occlusal factors and their contribution to TMD. (Verma, 2020).A significant lapse between the centric relation and maximum intercuspation seems to be linked to certain forms of TMD. According to Verma (2020), some studies consider the presence of mediation interferences to be a danger factor, while others think that same interferences could serve as a protective mechanism. There has been much discussion on the role that stress plays in the development of temporomandibular pain dysfunction syndrome. As per psychological research, individuals suffering from temporomandibular functional issues share comparable psychological characteristics and dysfunctions with those suffering from other chronic pain of musculoskeletal disorders, such as headache, tension, arthritic pain or backache (Porporatti et al., 2019).According to Barber-Smiley et al. (2021) there is a greater incidence of temporomandibular disorders (TMD) among women. All of the tissues that make up a joint may exhibit pathological changes. Chondrocyte clustering is the first step in the microscopic breakdown of articular cartilage in the early stages of osteoarthritis (Singgih et al., 2020).Cetira Filho et al. (2022) established the Diagnostic pattern with the aim of standardizing diagnosis based on epidemiologic data from different institutions. In addition to evaluating psychosocial factors and physical symptoms and signs (Axis I), the DC/TMD creates a diagnostic standard (BarbarSmiley et al., 2021).

An examination of the literature reveals that temporomandibular disorders have either been treated with a single medication or a mix of medications. Notwithstanding the paucity of evidence, NSAIDs (like ibuprofen or naproxen) have frequently remained the first choice for patients experiencing severe inflammatory pain. (Barbar-Smiley et al., 2021).

Ibuprofen is a non-selective COX inhibitor and an NSAID used to treat mild to moderate pain, fever, and inflammation. It is a non-selective inhibitor of cyclooxygenase, an enzyme involved in

prostaglandin (pain and fever mediators) and thromboxane (blood clotting stimulators) synthesis via the arachidonic acid route (Bushra R et al., 2010).

Omega-3 fatty acids have been shown in numerous studies to have positive benefits on inflammatory conditions. In clinical trials, their primary use has been for the treatment of rheumatoid arthritis. In other in-vitro research, fibroblasts were treated with omega-3 fatty acids to stimulate the formation of collagen. Along with this production, the level of prostaglandin E2, an inflammatory mediator, decreased. Therefore, omega-3 fatty acids may change the osteoarthritis (OA)-specific processes of inflammation and degradation. In 2020 Andrea Bahamondes and his co-workers saw the completion of a systemic review and meta-analysis on the effects of omega 3 on patients' painful symptoms related to synovial joint osteoarthritis (OA) (Bjørklund et al., 2019; Maqbool et al., 2021; Wu et al., 2021).

About 62% of people in our neighborhood have TMD. (Zaigham, 2021). While ibuprofen and other medications (such as muscle relaxants, anxiolytics, corticosteroids, and opioid analgesics) are readily available, other treatment alternatives are necessary due to the unintended side effects of existing medicines and the recurrence. According to Sririarchavatana, Kruger, Miller, Tian, and Wolber (2019), omega 3 has relatively few side effects and anti-inflammatory, anxiolytic, and bone-forming properties. Thus, we compared the effectiveness of conventional treatment i.e ibuprofen alone with ibuprofen and omega-3 fatty acid in managing the patients with TMJ disorder.

MATERIALS AND METHODS:

Double blind randomized control trial was used as a study design. Data was collected from Khyber College of Dentistry and Peshawar Dental College outpatient & oral medicine departments.Patients who met the study's inclusion requirements were included after receiving ethical permission from the ethical review committees of Khyber College of Dentistry and Peshawar Medical College. Between October 2021 and July 2022, the research participants' data was gathered.Patients with temporomandibular disorder (TMD) who have clicking, pain, & limited mouth opening, regardless of gender, between the ages of 15 and 35, and who have a complete permanent dentition were included in the study. TMJ Patients with neuropathic pain and other bone diseases (osteoporosis, osteopetrosis, and osteomalacia) were excluded. Patients with systemic disorders such as hypertension, congestive heart failure, and peptic ulcer disease, as well as pregnant patients were also excluded. There were 116 cases of TMJ disorder in the sample overall who were randomly allocated as 58 patients to the control group i.e conventional treatment group while 58 to the experimental group.

To the control group conventional treatment i.e ibuprofen 400 mg BD was given for thirty days, while to the experimental group ibuprofen 400 mg BD along with omega 3 fatty acid 1g OD was given for thirty days

A self-structured questionnaire was used to gather the data. Demographic and temporomandibular disorder-related characteristics, such as pain and frequency were included. Using a numerical rating scale, the pain was documented on day 0 of the treatment. A horizontal line (0–10) was employed, with the description reading, "No pain on the left end of the line, and very severe pain on the right end." The patients indicated on the line where their current level of pain corresponded to how they felt. A numerical rating scale with ordinals was used to calculate the score. Through the use of an appropriate chart, every patient's medication intake was guaranteed.

The patients were called again for evaluation of response to drugs after seven, fifteen, and thirty days period. The assessment of response to the medications was accomplished by numerical rating scale in the succeeding visits by alternative physician who was blind about the medications used (Lundeberg T, 2001).

STATISTICAL ANALYSIS:

SPSS version 21, a statistical package for social sciences, was used for data examination. Percentages & frequencies were used to express descriptive data. The data was found to be not normally distributed so Mann Whitney U test was employed for comparison. A statistically significant p-value was defined as 0.05 or less.

RESULTS:

The total number of patients was 116, 45.7% were male and 54.3% were female. They were divided in two groups, each comprising 58 patients. The Control group patients were given Ibuprofen alone and experimental group patients were given Ibuprofen plus Omega 3 for a period of thirty days. The age range of study subjects was 15-35 years and the mean age was 26.49± 8.35.

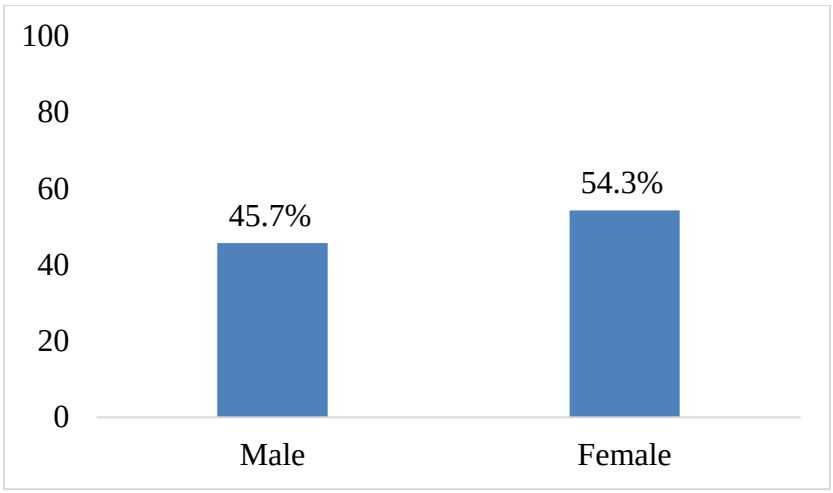

Figure 1: Distribution of gender among study subjects

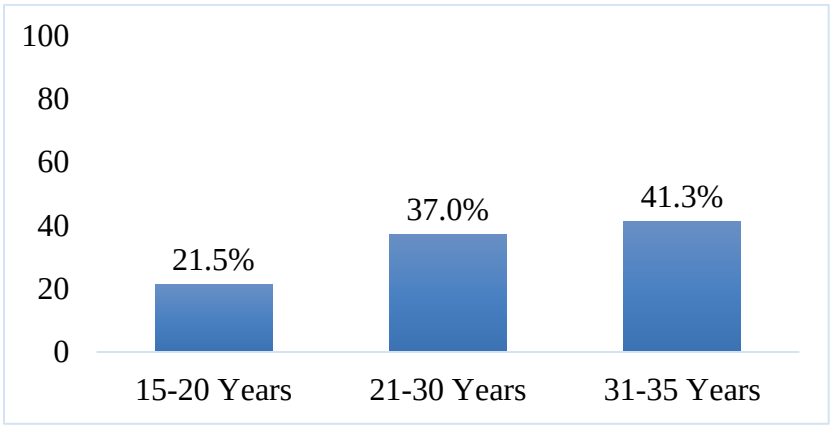

Figure 2: Distribution of age among study subjects

A: Distribution of mouth opening among the experimental groups

At baseline patients with limited mouth opening in Control Group were 91.4% and in Experimental group were 87.9%. At first follow-up 86.2% among Control group and 79.3% among Experimental Group had limited mouth opening while at 2nd follow-up the results were 44.8% and 31.0% among Control and experimental Group respectively, whereas at 3rd follow-up 18.9% and 10.3% among Control and experimental Group respectively, had limited opening of the mouth.

Table 1.1 shows distribution of mouth opening in Control Group and Experimental group.

Study groups	**Control Group**		**Experimental Group**	
Parameters (n=116)	**N=58**	**100%**	**N=58**	**100%**

DAY 0 (initial visit)	Normal	5	8.6	7	12.1
	Limited	53	91.4	51	87.9
Day 7 (1^{st} follow-up)	Normal	8	13.7	12	20.6
	Limited	50	86.2	46	79.3
Day 15 (2^{nd} follow-up)	Normal	32	55.1	40	68.9
	Limited	26	44.8	18	31.0
Day 30^{th} (3^{rd} follow-up)	Normal	47	81.0	52	89.6
	Limited	11	18.9	6	10.3

Both Groups have demonstrated improvement in mouth opening in patients with TMJ disorder.

Comparison of mouth opening between the two groups at the end of trial.

Table 1.2 Comparison between Groups at day 30^{th} for normal mouth opening.

Groups	**Number of patients with normal mouth opening at day 30^{th}**	**Percentage of patients with normal mouth opening at day 30^{th}**	**P-value**
Control Group	47	81.0%	0.135
Experimental Group	52	89.6%	

*p-value Significant at <0.05

Both groups have demonstrated the similar effects as far as mouth opening in patients with TMJ disorder is concerned. There is no statistically significant difference between the groups in this regard.

B: Distribution of lateral excursion among the experimental groups.

At baseline patients with limited lateral excursion in Control Group were 91.4% while in experimental Group were 93.1%. At first follow-up 82.7% among Control Group and 74.1% among experimental Group had limited lateral excursion while at 2nd follow-up the results were 69.0% and 55.2% among Control and Experimental Groups respectively, whereas at 3rd follow-up 20.7% and 8.6% among Control and experimental Groups respectively, had limited lateral excursion.

Table 2.1 shows distribution of lateral excursion between the two groups.

Study groups		**Control Group**		**Experimental Group**	
Parameters (n=116)		**N=58**	**100%**	**N=58**	**100%**
DAY 0 (initial visit)	Normal	5	8.6	4	6.8
	Limited	53	91.4	54	93.1
Day 7 (1st follow-up)	Normal	10	17.2	15	25.8
	Limited	48	82.7	43	74.1
Day 15 (2nd follow-up)	Normal	18	31.0	26	44.8
	Limited	40	69.0	32	55.2
Day 30th (3rd follow-up)	Normal	46	79.3	53	91.4
	Limited	12	20.7	5	8.6

Both Groups have demonstrated improvement in lateral excursion in patients with TMJ disorder.

Comparison of lateral excursion between the two groups at the end of trial.

Table 2.2 Comparison between Groups at day 30th for normal lateral excursion.

Groups	**Number of patients with normal lateral excursion at day 30th**	**Percentage of patients with normal lateral excursion at day 30th**	**P-value**

Control Group	46	79.3%	0.471
Experimental Group	53	91.4%	

*p-value Significant at <0.05

Both groups have demonstrated the similar effects as far as lateral excursion in patients with TMJ disorder is concerned. There is no statistically significant difference between the groups in this regard.

C: Distribution of headache between the two groups.

At baseline patients with severe headache in Control Group were 43.1% while in experimental group were 48.2%. At first follow-up 36.2% were among Control Group and 36.2% among Experimental Group had severe headache while at 2nd follow-up the results were 20.6% and 15.5% among Control and Experimental Groups respectively, whereas at 3rd follow-up in both groups there was no severe pain.

Table 3 shows distribution of severity of headache between the Groups.

Study subjects		**Control Group**		**Experimental Group**	
Parameters (n=116		**N=58**	**100%**	**N=58**	**100%**
Day 0 (initial visit)	No pain (0)	3	5.1	4	6.8
	Mild (1-3)	10	17.2	8	13.7
	Moderate (4-6)	20	34.4	18	31.0
	Severe (7-10)	25	43.1	28	48.2
Day 7 (1st follow-up)	No pain (0)	7	12.0	8	13.7
	Mild (1-3)	15	25.8	13	22.4
	Moderate (4-6)	15	25.8	16	27.5
	Severe (7-10)	21	36.2	21	36.2
Day 15	No pain (0)	15	25.8	19	32.7

(2nd follow-up)	Mild (1-3)	18	31.0	20	34.4
	Moderate (4-6)	13	22.4	10	17.2
	Severe (7-10)	12	20.6	9	15.5
Day 30 (3rd follow-up)	No pain (0)	30	51.7	40	69.0
	Mild (1-3)	20	34.4	18	31.0
	Moderate (4-6)	8	13.7	0	0.0
	Severe (7-10)	0	0.0	0	0.0

Both groups have relieved headache at day 30.

D: Distribution of neck ache between the two groups.

At baseline patients with severe neck ache in Control Group were 39.6% while in experimental Group were 44.8%. At first follow-up 31.03% were among Control Group and 32.7% among Experimental Group had severe neck ache while at 2nd follow-up the results were 10.3% and 6.8% among Control and Experimental Groups respectively, whereas at 3rd follow-up in both groups there was no severe pain.

Table 4 shows distribution of severity of neck ache between the two groups:

Study subjects		**Control Group**		**Experimental Group**	
Parameters (n=116		**N=58**	**100%**	**N=58**	**100%**
Day 0 (initial visit)	No pain (0)	2	3.4	3	5.1
	Mild (1-3)	11	18.9	9	15.5
	Moderate (4-6)	22	37.9	20	34.4
	Severe (7-10)	23	39.6	26	44.8
Day 7 (1st follow-up)	No pain (0)	6	10.3	7	12.0
	Mild (1-3)	19	32.7	15	25.8
	Moderate (4-6)	15	25.8	17	29.3
	Severe (7-10)	18	31.0	19	32.7

Day 15 (2nd follow-up)	No pain (0)	20	34.5	24	41.3
	Mild (1-3)	22	37.9	23	39.6
	Moderate (4-6)	10	17.2	7	12.0
	Severe (7-10)	6	10.3	4	6.8
Day 30 (3rd follow-up)	No pain (0)	33	56.8	45	77.5
	Mild (1-3)	20	34.4	13	22.4
	Moderate (4-6)	5	8.6	0	0.0
	Severe (7-10)	0	0.0	0	0.0

Both the groups have relieved neck ache at day 30.

E: Distribution of earache between the two groups.

At baseline patients with severe earache in Control Group were 48.2% while in experimental were 50.0%. At first follow-up 37.9% were among control Group and 34.4% among Experimental Group had severe earache while at 2nd follow-up the results were 13.7% and 10.3% among Control and Experimental Groups respectively, whereas at 3rd follow-up in both groups there was no severe pain.

Table 5 shows distribution of severity of earache between the groups.

Study subjects		**Control Group**		**Experimental Group**	
Parameters (n=116		**N=58**	**100%**	**N=58**	**100%**
Day 0 (initial visit)	No pain (0)	0	0.0	0	0.0
	Mild (1-3)	8	13.7	9	15.5
	Moderate (4-6)	22	37.9	20	34.4
	Severe (7-10)	28	48.2	29	50.0
Day 7 (1st follow-up)	No pain (0)	5	8.6	6	10.3
	Mild (1-3)	13	22.4	8	13.7
	Moderate (4-6)	18	31.0	14	24.1
	Severe (7-10)	22	37.9	20	34.4

Day 15 (2nd follow-up)	No pain (0)	16	27.5	16	27.5
	Mild (1-3)	22	37.9	24	41.3
	Moderate (4-6)	12	20.6	12	20.6
	Severe (7-10)	8	13.7	6	10.3
Day 30 (3rd follow-up)	No pain (0)	32	55.1	43	74.1
	Mild (1-3)	23	39.6	15	25.9
	Moderate (4-6)	3	5.17	0	0.0
	Severe (7-10)	0	0.0	0	0.0

Both groups have relieved ear ache at day 30.

F: Distribution of severity of pain at temporomandibular joint (TMJ) between the two groups.

When we observed the severity of pain by numerical rating scale (NRS) between the two groups it was observed that at baseline 63.7% in Control Group and 68.9% in Experimental Group had severe pain. At first follow-up 56.8% among Control Group and 36.2% among Experimental Group had severely pain while at 2nd follow-up the results were 25.8% and 6.8% among Control and experimental Groups respectively, whereas at 3rd follow-up in both groups there was no severe pain.

Table 6 shows distribution of severity of pain at TMJ between the two groups.

Study subjects		**Control Group**		**Experimental Group**	
Parameters (n=116		**N=58**	**100%**	**N=58**	**100%**
Day 0 (initial visit)	No pain (0)	0	0.0	0	0.0
	Mild (1-3)	2	3.4	1	1.7
	Moderate (4-6)	19	32.7	17	29.3
	Severe (7-10)	37	63.7	40	68.9
Day 7 (1st follow-up)	No pain (0)	0	0.0	1	1.7
	Mild (1-3)	5	8.6	14	24.1
	Moderate (4-6)	20	34.4	22	37.9

	Severe (7-10)	33	56.8	21	36.2
Day 15 (2nd follow-up)	No pain (0)	9	15.5	11	19.0
	Mild (1-3)	20	34.4	28	48.3
	Moderate (4-6)	14	24.1	15	25.8
	Severe (7-10)	15	25.8	4	6.8
Day 30 (3rd follow-up)	No pain (0)	29	50.0	39	67.2
	Mild (1-3)	20	36.2	19	32.7
	Moderate (4-6)	9	15.5	0	0.0
	Severe (7-10)	0	0.0	0	0.0

Both groups have relieved pain at TMJ at day 30.

G: comparison between groups at day 30th for different types of pain relief:

Table 7: Comparison between Control and Experimental Group at day 30th for different types of pain relief.

Outcome variables	**Groups**	**Number of patients with total pain relief at day 30th**	**Percentage of patients with total pain relief at day 30th**	**p-value**
Headache	Control Group	30	51.7%	0.005
	Experimental Group	40	69.0%	
Neck ache	Control Group	33	56.8%	0.002
	Experimental Group	45	77.5%	
Ear ache	Control Group	32	55.1%	<0.05
	Experimental Group	43	74.1%	
Pain at TMJ	Control Group	29	50.0%	<0.05
	Experimental Group	39	67.2%	

*p-value Significant at <0.05

When we compared the number of patients with different types of pain relief in both the groups at the end of the trial, it was observed that the results of treatment in experimental group were significantly better than the results of treatment in Control group.

DISCUSSION:

Pharmacological treatment for TMDs can take many different forms, but if medication isn't working on its own, it's usually paired with other forms of treatment, such as physical therapy and oral appliances. Patients should be aware that although treatment can alleviate symptoms, a cure is not possible. Regretfully, not enough data has been gathered to support the long-term usage of any of these pharmacotherapies over against the others.

There were 116 patients in all that participated in our study. Of them, 54.3% were female & 45.7% were male. Ibuprofen alone was administered to the patients in control group while ibuprofen with omega 3 was given to the patients in experimental group. The study volunteers' ages ranged from 15 to 35 years old, with a mean age of 26.49± 8.35. Impact of the conventional as well as experimental treatment on patients with TMJ disorders in terms of mouth opening, was not significantly different.

Similarly, the effect of the conventional as well as experimental treatment on patients with TMJ disorders in terms of restricted lateral excursion was also not significantly different.

In contrast to our findings Thie Nm et al., 2001 have reported that patients taking omega 3 with Glucosamine Sulphate had a significantly greater TMJ function stability (mouth opening & lateral excursion) than glucosamine sulphate alone group. (Gruenwald, Petzold, Busch, Petzold, & Graubaum, 2009; Thie, Prasad, & Major, 2001).

In our study both groups have been relieved from different types of pain related to TMJ disorder at day 30. However, experimental Group was relieved better than Control Group.

In concordance to our study Conville, et al., 2019 reported that analgesics (paracetamol and NSAIDs) are the mainstay for the management of headache and myofacial pains associated with TMDs (Conville, Moriarty, & Atkins, 2019).

In favor to our study Maroon & Bost.,2006 reported that omega-3 alone demonstrated equivalent effect as like ibuprofen alone in reducing arthritic pain (Maroon & Bost, 2006).

A randomized control trial was conducted on NSAID (naproxen) that showed significant decrease in pains associated with TMDs than celecoxib and placebo. So Gauer et al., 2015 concluded that referred pains (headache, neck ache, earache and facial pains) associated with TMDs are initially treated with muscle relaxants and NSAIDs while anti-depressants and benzodiazepines may be added for chronic pains (Gauer & Semidey, 2015).

Though none of the study compared NSAIDs with omega-3 for the treatment of symptoms associated with temporomandibular joint disorder as like our study.

CONCLUSION:

According to our evaluation the patients experienced pain relief and noticeably improved outcomes with ibuprofen and omega 3 combination as compared to conventional treatment alone. To obtain results that are validated, it is advised that more controlled studies be conducted with a large sample size and extended follow-ups.

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Authors Contribution

Concept & Design of Study: Amna Umar1,

Drafting: Erum Rehman2

Data Analysis: Erum Rehman2

Critical Review: Amna Umar1,

Final Approval of version: Amna Umar1,

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