

*Full Length Research Paper*

# Opinion and knowledge of Nigerian physiotherapists on relevance and usefulness of pharmacology education on dosage of topical medications

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The aims of this study were to evaluate the knowledge of Nigerian physiotherapists on dosage prescription for topical medications using Finger Tip Unit as an index; and also to determine their opinion on impact and usefulness of pharmacology education on topical medications. A self-administered questionnaire was utilized for this study. The participants were classified into 2 groups: those who had pharmacology education (48 participants) and those without formal education (59 participants) during undergraduate training. The data were analyzed using descriptive and non-parametric inferential statistics. Thirty-five respondents (85.4%) and 37 respondents (67.3%) of those with and without pharmacology education respectively showed poor knowledge of prescription dosages using Finger Tip Unit. A range of 66.1% to 83.3% of respondents did not respond to the questions on dosage of topical medications while only a range of very few (14.6% - 37.2%) knew the equivalence of FTU in gram among the 2 groups. The result showed that 38 physiotherapists (79.1%) and 46 (78.0%) with and without pharmacology education respectively agreed that extensive pharmacology education would have improved their knowledge of topical drugs and prescription. Similarly, 39 physiotherapists (81.3%) and 44 (80.0%) with and without pharmacology education respectively agreed that an extensive knowledge of pharmacotherapy is useful to practice and that it increases the quality of clinical practice. The result of the Chi square test showed that the number of respondents without pharmacology education who agreed with the positive opinion statements was significantly higher than that of those who had pharmacology education ( $X^2 = -2.32$ ,  $P = 0.003$ ). The study concluded that both physiotherapists with and without pharmacology training have poor knowledge of dosage prescription of topical medications using FTU. Also, most respondents opined that pharmacology is relevant and useful to clinical physiotherapy practice.

**Key words:** Pharmacology education, clinical physiotherapy, relevance and usefulness, prescription dosages, Finger Tip Unit.

## INTRODUCTION

Most times, patients expect physiotherapists to give advice on medications but it appears physiotherapists have very little formal training in drug therapies; and there is no clarity to the extent to which physiotherapists can advise patients on medications (Lansbury and Sullivan, 2002). However, it is uncertain if pharmacology education has abundantly enhanced the theoretical and

professional skills after graduation. Physiotherapy profession recognizes the benefits of extending prescribing rights in terms of benefits to patients and enhancing effective physiotherapeutic interventions (Chartered Society of Physiotherapy, 2004).

In Australia, Non-Steroidal Anti Inflammatory Drugs (NSAIDs) are by far the most common pharmaceuticals often used as adjunct therapy to physiotherapy management of musculoskeletal disorders (Moore et al., 1998). In United Kingdom, Physiotherapists have now been listed among the group of supplementary prescribers (MHRA, 2002).

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They work with the independent prescriber to fulfill a clinical management plan between the prescriber and the patient (MHRA, 2002). It is important that physiotherapists know the indications for use of each topical drug (Chartered Society of Physiotherapists, 2004). Kumar and Grimmer (2005) emphasized 'gray' areas in the use of topical drugs especially NSAIDs where Physiotherapists' should seek knowledge and legislation.

National Health Services employers are empowering qualified nurses, midwives and therapists to undertake a wider range of clinical tasks including the right to make and receive referrals, admit and discharge patients, order investigations and diagnostic tests, run clinics and prescribe drugs' (NHS, 2000).

Most Nigeria training institutions have expanded the curriculum to encompass Pharmacology, Neuroanatomy and Nutrition in Health and Diseases. The expected role is ensuring that patients use NSAIDs and other topical drugs appropriately as an adjunct to physiotherapy management and they should be able to recognize the potential role of oral or topical NSAIDs in individual symptom management, recommend, and discuss with pharmacists or the general medical practitioner (Grimmer et al., 2002). Studies provide evidences that pharmacotherapy, in recent days, has become an indispensable adjunct to the effectiveness of the practice of physiotherapy (Konitzer, 2003, Czlonkowska and Lesniak (2009); Magos , 2006; Olszewski , et al., 2007; Zafonte, 2001). Good knowledge of topical drugs and interactions are very important to practicing physiotherapists as most dugs interact with modalities and other interventions.

Concerted effort had been made to provide quantification for topical cream and gel using Finger Tip Unit (FTU). A FTU is defined as the amount of ointment, cream or other semi-solid dosage form expressed from a tube with a 5mm diameter nozzle, applied from the distal skin-crease to the tip of the index finger of an adult and it is a practical measure for determining dose of topical medications (Finlay et al., 1989; Long and Finlay, 1991). Finger Tip Unit appears not to be frequently used by physiotherapists in Nigeria. Despite the introduction of pharmacology education into most training programmes, there appears to be indiscriminate use of dosages for topical medications among Nigerian physiotherapists. Quantifying appropriate and effective therapeutic dose of relevant medications has been the major bane of providing qualitative care for clients. There is dearth of research work on assessment of pharmacology knowledge of physiotherapists. It also appears that little focus is placed on adequacy and specificity for topical medications prescription among physiotherapists. The objectives of this study were to determine the knowledge of physiotherapists on the use of Finger Tip Unit in topical medications prescription and to determine their opinion on relevance and usefulness

of pharmacology education on clinical practice. It was hypothesized that there would be no significant difference in the number of respondents who agreed and disagreed on the relevance and usefulness of pharmacology education between physiotherapists that had undergraduate pharmacology education and those who did not have formal training.

## METHODOLOGY

### Participants

The sample size consisted of one hundred and seven (107) practicing physiotherapists who were purposively selected from government and private hospitals; clinics and physiotherapy training institutions in southwest Nigeria.

### Inclusion criteria

The participants for the study were practicing clinicians and academics with at least one year clinical experience and were licensed by the Medical Rehabilitation Therapists Registration Board of Nigeria. This study took into consideration, the participants who were willing to answer the questionnaire immediately and return it.

### Instrumentation

The instrument used in obtaining information was a modification of questionnaire used by Grimmer et al., (2002) and Onigbinde et al., (2011). This questionnaire (Appendix) took into account differing educational backgrounds, and modes of knowledge acquisition, thus, the questions were kept simple and straight forward, with a 'Yes, No, I Don't Know' option and the checklist option. The questionnaire was divided into 4 sections:

a. Demographics and Academic-related data that comprised 12 questions ranging from bio-data to years of experience and mode of knowledge acquisition.

b. Section B had eight questions which sought for information on work settings and continuing professional development seminars.

c. Current knowledge on Pharmacotherapy: constituted 15 questions, four of which were open-ended questions that required a checklist and eight were of the 'Yes, No, I Don't Know' option. Participants were asked if they were taught clinical applications of Diclofenac diethyl ammonium, Piroxicam, Methyl salicylate, menthol, Ketoprofen, Glucosamine, Gentamicin, Histamine and Diethyl amine in pharmacology education. They were also to respond to question on which form of drugs (topical or oral) should be taught more during undergraduate training,

**Table 1.** Demographics of Physiotherapists with and without Undergraduate Pharmacology Training.

Variables	Without		With	
	Frequency	Percentage	Frequency	Percentage
<b>Gender:</b> Male	38	64.4	24	50.0
Female	21	35.6	24	50.0
<b>Program:</b> 4 years	51	86.4	15	31.3
5 years	8	13.6	33	68.8
<b>Experience:</b> < 5 years	18	30.5	29	60.4
6- 10 years	16	27.1	12	25.0
11-15 years	14	23.7	2	4.2
16-20 years	9	15.3	3	6.3
>20 years	2	3.4	2	4.2
<b>Qualifications:</b>				
Bachelor Degree	32	54.2	36	75.0
Masters Degree	25	42.4	9	18.8
Doctorate	2	3.4	3	6.3

knowledge on the number of FTU required for prescribing topical Diclofenac diethyl ammonium and Methyl salicylate and which is more appropriate for inflammatory, acute and chronic conditions. This section also contained questions on equivalence of 1 FTU to gram.

d. The fourth section was a table that evaluated positive opinion statements on training, quality, relevance, and usefulness of undergraduate pharmacology/ pharmacotherapy study. They were to rate their agreement on a 5-point likert scale:

- 5 – Very strongly agree
- 4– Strongly agree
- 3. – agree
- 2– Disagree
- 1 – Strongly disagree

A pilot study was conducted prior to the actual data collection using the draft of the modified questionnaire in multistage phases. Twelve physiotherapists who were not part of the main study were implored to complete the questionnaire in order to determine whether the questions were appropriately framed.

corrections were made until layout, content, wording and intent were clear and appropriate. The revised questionnaire was returned to these same physiotherapists thrice until it was certified okay and appropriate.

### Sampling technique

Purposive sampling technique was used to select both the hospitals and physiotherapists who had and those who were without undergraduate pharmacology education during training.

### Research design

This study was a cross sectional exploratory study.

### Procedure

Ethical approval was given by the Ethics and Research

**Table 2.** Frequency Distribution on Knowledge of Physiotherapists.\*

Variables	Without		With		
	Frequency	%	Frequency	%	
<b>Preference of Voltaren gel:</b> Acute conditions	54	98.2	40	93.0	
	Chronic conditions	1	1.7	3	7.0
<b>Equivalence of 1 FTU is 0.5 gram:</b> Yes	18	37.2	6	14.6	
	No	37	67.3	35	85.4
<b>Dosage of typical drug:</b> 1 FTU	9	15.3	2	15.3	
	2 FTU	10	16.9	4	8.3
	3 FTU	1	1.7	2	4.2
	Nil response	39	66.1	40	83.3
<b>Dosage of Voltaren gel:</b> 1 FTU	9	15.3	4	8.3	
	2 FTU	7	11.9	3	6.3
	Use of Dosage card	1	1.7	2	4.2
	Nil response	42	71.2	39	81.3

\*The valid percentage was computed based on the number of respondents to each variable.

Committee of the Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, Osun State, Nigeria for the study and permission was sought from the respective Heads of the work settings selected for the study. One hundred and fifty copies of questionnaire were administered to the participants personally and in order to maintain anonymity, participants' names were not required on the questionnaires. The questionnaires were completed at a prearranged time and place; this was to ensure the convenience of participants and to prevent bias or any act of cheating in answering of the questions. The correct answers to these questions were thoroughly researched and provided by the principal investigator and a certificated pharmacologist.

The copies of questionnaire were then separated into 2 groups- those who had pharmacology training during undergraduate training and those who did not.

### Data analysis

The agreement levels were collapsed into 2: Agreed and disagreed for analysis, with level 1 -2 as disagreed and 3 – 5 as agreed for analysis. Descriptive statistics of frequency mean and standard of deviation were used to analyze the data obtained. Mann Whitney test was used to compare the mean percentage difference in the number of physiotherapists with differing opinion. Data analysis was carried out using statistical package for social sciences software, version 17 (SPSS Inc., Chicago, and U.S.A).

### RESULTS

Responses were obtained from one hundred and seven (107) physiotherapists out of 150 copies of questionnaire distributed representing a response rate of 71.3%. The

result showed that 59 respondents did not offer pharmacology during undergraduate training. However, 48 respondents had pharmacology education during undergraduate training. Other demographic details were presented in Table 1.

Among those that did not have formal pharmacology education, the result showed that 54 respondents (98.2%) had good knowledge of the indications for use of both Methyl salicylate and Diclofenac diethyl ammonium gel. They reported that they would prefer the usage of Voltaren gel to Methyl salicylate gel in acute inflammatory conditions. Similarly, for physiotherapists with undergraduate pharmacology training, 40 respondents (93.0%) had a good knowledge of the 2 topical medications. However, respondents showed a poor knowledge of dosage prescription using FTU. Only 18 respondents (32.7%) chose correctly the option of 1 FTU is equivalent to 0.5gram. Similarly, among those with formal pharmacology education, only 6 respondents (14.6%) chose correctly the equivalence of FTU to gram.

On dosage of a typical drug, only 10 respondents (16.9%) answered correctly the required number of FTU. In response to the question on the typical dosage of topical Diclofenac diethyl ammonium, 8 respondents (13.6%) answered correctly the use of Diclofenac diethyl ammonium dosage card. A larger percentage(a range of 66.1%to83.3%)of the respondents did not respond to the questions on dosage of topical medications (Table 2). However, when the 48 respondents who had undergraduate pharmacology training were asked if they were taught the clinical application of the topical forms of these drugs; there were 181 responses (multiple choices), 13 respondents (27.1%) reported they had class sessions on teaching of Piroxicam, 37 respondents (77.1%) on diclofenac, 37 respondents (77.1%) on Methyl Salicylate while 27 respondents (56.3%) indicated that they were taught Menthol (table 3).

**Table 3.** Frequency distribution of Physiotherapists who reported teaching of oral and topical drugs.

Drugs	Oral		Topical	
	N	%	N	%
Piroxicam	21	43.8	13	27.1
Diclofenac	37	77.1	37	77.1
Methyl Salicylate	38	79.2	37	77.1
Menthol	24	50.0	27	56.3
Ketoprofen	2	25.0	8	16.7
Glucosamine	33	68.8	26	54.2
Gentamicin	13	27.1	7	14.6
Histamine	27	56.3	17	35.4
Diethylamine	15	31.3	9	18.8

Key: n= frequency %= percentage, \*There were multiple responses for each drug.

**Table 4.** Legislation Regarding topical Drugs. \*\*

Variables	Without			With		
	Yes	No	Don't Know	Yes	No	Don't Know
	N %	N %	N %	N %	N %	N %
Support legislation	42 (91.3%)	1 (2.2%)	3 (6.5%)	28 (58.3%)	3 (6.3%)	17 (35.4%)
OTC legislation	37 (68.5%)	13 (22.0%)	4 (6.8%)	29 (67.4%)	12 (29.7%)	2 (4.7%)
Knowledge*	11 (18.6%)	34 (57.6%)	14 (23.7%)	14 (31.8%)	22 (50.0%)	8 (18.2%)
Willingness to study*42	42 (71.2%)	12 (20.3%)	5 (8.5%)	2 (50.0%)	15 (34.1%)	7 (15.9%)

Keys: N= frequency, %= percentage, \*Pharmacophysical therapy.

\*\*The valid percentage was computed based on the number of respondents to each variable.

In testing knowledge of physiotherapists with pharmacology education, respondents showed a poor knowledge of dosage prescription similar to that of physiotherapists without pharmacology education (Table 2). Among those without pharmacology education, out of 46 respondents, 42 respondents (91.3%) supported enacting a legislation that will officially permit physiotherapists to prescribe topical drugs while only 28 out of 48 respondents (58.3%) among those had formal pharmacology supported the enactment. Out of 54 respondents, 37 (68.5%) supported legislation that will

officially permit physiotherapists to prescribe OTC (Over the Counter) drugs (Table 4).

Similarly, among those with pharmacology education, most physiotherapist (31 [70.5%]) reported that they studied relevant pharmacology during training, and the duration of study ranged from 1 semester (50%) to 2 semesters (50%).

Table 5 presents number of Physiotherapists who reported being taught oral and topical drugs. There were 220 responses (multiple choices). The result of the Chi-square showed that there was no significant difference in

**Table 5.** Opinion on Undergraduate Pharmacology Curriculum.

Variables		Frequency	%	X <sup>2</sup>	P
<b>More oral than topical:</b>	Yes	21	48.8	30.5	0.39
	No	22	51.2		
<b>Teaching:</b> With students in Medicine	Yes	17	35.4	-	-
	No	27	56.3		
Separated teaching:	Yes	30	69.8	-	-
	No	13	30.2		

\*The valid percentage was computed based on the number of respondents to each variable.

**Table 6.** Opinion of Physiotherapists on knowledge of Pharmacology education.

	Groups	Agreement	F	%
Extensive pharmacology would have improved Knowledge of topical drugs and prescription:	1	Agreed	38	79.1
		Disagreed	10	20.9
	2	Agreed	46	78.0
		Disagreed	12	22.0
I have good knowledge of topical NSAIDs:	1	Agreed	39	81.3
		Disagreed	9	18.7
	2	Agreed	42	71.2
		Disagreed	13	28.8
Pharmacology education reduces inferiority	1	Agreed	32	66.7
		Disagreed	16	33.3
	2	Agreed	44	74.5
		Disagreed	11	25.5
Seminars will increase knowledge of Pharmacotherapy and drug interactions	1	Agreed	34	70.8
		Disagreed	14	29.2
	2	Agreed	47	77.0
		Disagreed	9	23.0

Group 1- Physiotherapists with pharmacology education

Group 2- Physiotherapists without pharmacology education

\*The valid percentage was computed based on the number of respondents to each variable.

the number of respondents who opined that topical forms of drugs during undergraduate training should be emphasized and those who opined otherwise ( $X^2=30.50$  and  $P = 0.39$ ), (Table 5). Thirty respondents (69.8%) felt teaching of pharmacology should be taught separately for undergraduate physical therapy students rather than combining teaching with students in medicine. The result showed that 38 (79.1%) and 46 (78.0%) physiotherapists with and without pharmacology education respectively

agreed that extensive pharmacology education would have improved their knowledge of topical drugs and prescription (Table 6). Similarly, 40 physiotherapists (83.3%) and 48 (81.3%) with and without pharmacology education respectively agreed that Pharmacology is relevant to clinical physiotherapy practice. Also, 39 physiotherapists (81.3%) and 44 (80.0%) with and without pharmacology education respectively agreed that an extensive knowledge of pharmacotherapy is useful to

**Table 7.** Opinion of Physiotherapists on relevance and usefulness of Pharmacology education.

	Groups	Agreement	F	%
Pharmacology is relevant to clinical physiotherapy practice	1	Agreed	40	83.3
		Disagreed	8	16.7
	2	Agreed	48	81.3
		Disagreed	8	18.7
Knowledge of pharmacotherapy increases quality of practice	1	Agreed	39	81.3
		Disagreed	8	18.7
	2	Agreed	44	80.0
		Disagreed	11	20.0
Pharmacology knowledge has positive impact	1	Agreed	36	75.0
		Disagreed	8	25.0
	2	Agreed	43	79.6
		Disagreed	11	20.4
Usefulness of pharmacology in clinical practice	1	Agreed	39	81.3
		Disagreed	8	18.7
	2	Agreed	44	80.0

Group 1- Physiotherapists with pharmacology education

Group 2- Physiotherapists without pharmacology education

\*The valid percentage was computed based on the number of respondents to each variable.

**Table 8.** Comparison of number of physiotherapists who agreed and disagreed on the positive opinion statements.

Groups	Mean of Respondents	SD	X <sup>2</sup>	P
<b>Agreement:</b> Non pharmacology	41.50	4.20		
Pharmacology	30.75	7.18	-2.32	0.03
<b>Disagreement:</b> Non pharmacology	13.50	3.11		
Pharmacology	12.75	6.85	-1.16	0.34
<b>Total levels of agreement:</b> Agreed	36.13	7.92		
Disagreed	13.13	4.94	0.94	0.99

practice and that it increases the quality of clinical practice. Among those with pharmacology education, 39 (81.3%) agreed that knowledge of pharmacotherapy increases quality of practice (Table 7).

The mean number of respondents among physiotherapists without pharmacology education who agreed with the positive opinion statements was  $41.5 \pm 4.20$  while that of respondents with pharmacology education was  $30.75 \pm 7.18$ . The result of the Chi square showed that the mean number of respondents without pharmacology education who agreed with the positive opinion statements was significantly higher than that of those who had pharmacology education ( $X^2 = -2.32$ ,  $P = 0.03$ ), (Table 8). However, there was no significant difference in the numbers that disagreed between the 2 groups. The total number of respondents that agreed with

the opinion statements was significantly higher than the number that disagreed ( $X^2 = -2.38$ ,  $P = 0.02$ ).

## DISCUSSION

Analgesics and non steroidal anti-inflammatory drugs (NSAIDs) are the most common pharmaceuticals for alleviating pain and reduced function of musculoskeletal conditions (Moore et al., 1998) and concerns have been formally expressed regarding physiotherapists' role in drug administration since 1992 (Grimmer et al., 2002). Acquiring the right to prescribe medication was not about the profession but to make things better for patients, so that they can get appropriate medicines from the health professional that is best placed to assist (Pip, 2011).

It has been documented that topical medications have similar risks as oral medications. Topical methyl salicylate ointments used in cardiac patients receiving anticoagulation therapy portends risk of bleeding manifestation, bruises in the skin and gastrointestinal bleeding (Yip et al., 1990). It causes local irritation, dermatitis, local burns injury, skin redness and various degree of pain after about an hour of application (Yip et al., 1990).

In this current report, respondents in this study had good knowledge of the indications for the use of Diclofenac diethyl ammonium and Methyl salicylate; however, there was similarity in the trend of poor knowledge on dose specificity for topical medications among physiotherapists with and without pharmacology education using FTU in quantifying relevant topical medications. Most respondents did not know the equivalence of FTU in gram. The poor knowledge observed may be attributed to the joint teaching with students in medicine and dentistry, whereas, emphasis should have been placed on teaching relevant topical medications applicable to clinical physiotherapy practice. The lower percentage observed in the number of physiotherapists with poor knowledge among respondents without pharmacology education might be attributed to higher years of clinical experience. This appears to conform to the assumption that clinicians with more experience in general have accumulated knowledge and skills during years in practice. However, this contradicts the report of Hartz et al., (1999) that among physicians, evidence suggests that there is an inverse relationship between the number of years that a physician has been in practice and the quality of care been provided.

There is advocacy for the use of FTU in order to reduce variation in usage of topical steroids and also to encourage adherence to therapy (McHenry et al., 1995; Feldman et al., 2008). Long and Finlay (1991) reported that FTU in dermatological prescription provides a readily understandable measure for both clients and the prescriber and that in males one FTU covers  $312 \pm 90\text{cm}^2$  skin area while in females it covers  $257 \pm 55\text{cm}^2$ . One FTU can treat an area of skin twice the size of a "handprint" and one handprint is 0.8% of the total body surface area and 2 FTUs are approximately equivalent to 1g of topical application. The "Rule of Hand" states that "4 hand areas are equal to 2 FTU and also equal to 1gram". In a study by Long and Finlay (1991) where 30 adult-patients were treated at various anatomical regions using FTU's of ointment, it was found that the number of FTUs required for face and neck were  $2.5 \pm 0.8$ ; front of trunk  $6.7 \pm 1.7$ ; back of trunk  $6.8 \pm 1.2$ ; arm and forearm  $3.3 \pm 1.0$ ; hand  $1.2 \pm 0.4$ ; leg and thigh  $5.8 \pm 1.7$ ; foot  $1.8 \pm 0.6$ .

Previous studies have shown that there are still deficiencies in the pharmacology training offered to

physiotherapy undergraduates (Walid, 2003). This further supports the reports of Lansbury and Sullivan (2002) and Onigbinde et al., (2012) who reported that physiotherapists advised and administered medications (topical as well as Over-The-Counter) to their clients despite having limited knowledge about the appropriateness, side effects and contraindications of specific medications in clinical practice. It corroborates the study of Grimmer et al., (2005) who also reported that physiotherapists are not fully informed and knowledgeable enough about topical medications.

Furthermore, Kumar and Grimmer's (2005) reported that physiotherapist's knowledge of NSAIDs were average to poor but that undergraduate and post graduate education should be sufficient to understand the actions and range of effects of NSAIDs. Despite the recognition of the role of physiotherapists in quality medications used by patients, the change in scheduling of NSAIDs has not been accompanied by concerted attempts to educate physiotherapists about their responsibilities that might have changed (Lansbury and Sullivan, 1998; Mc Kellar, 1999; Grimmer et al., 2002).

The expectation is that education on topical drugs should be emphasized for undergraduate physiotherapy students. This study identified with the need for a standard, independent and up-to-date education on the use of topical medication towards enhancing clinical physiotherapy practice. This study also affirms the need for continuing professional development seminars on use of topical medications as it was suggested by Onigbinde et al., (2012).

Most physiotherapists opined that an extensive knowledge of pharmacotherapy is relevant to clinical practice, useful, have positive impact, and that it also increases the quality of clinical practice. Physiotherapists without pharmacology training opined that their practice (skill, knowledge of topical drugs and advice/prescription to patients) would have been better if they had a better and more extensive knowledge of pharmacology. The implication of this opinion is that pharmacology is relevant and useful in clinical practice. This corroborated the study of Grimmer et al., (2002), who reported evidence on the role of physiotherapists in the use, recommendation and delivery of NSAIDs.

Despite undergraduate training for those who had pharmacology education, most physiotherapists avoided questions on knowledge and this was the trend in previous reports. The high percentage of 'don't know' response and the incorrect ones indicated that there is need for more education for physiotherapists on topical medications. Physiotherapists are expected to have knowledge of topical medications they recommend and commonly use in clinical practice (Onigbinde et al., 2012). This re-affirmed the study of Grimmer et al., (2002) in Australia, and Onigbinde et al., (2012) in Nigeria.



Most physiotherapists in this study supported enacting a law that will permit them in formally prescribing topical medications. There is need for legislation to protect physiotherapists from situations where limited training in pharmacology could inadvertently place patients at risk of greater harm than good when using NSAIDs. Although, physiotherapists are not directly involved in the prescriptions and administration of most oral and some topical drugs, a comprehensive knowledge of pharmacotherapy will serve as best approach. This will also avoid medico-legal complications (Lansbury and Sullivan; 1998).

This study concluded that both physiotherapists with and without pharmacology training have poor knowledge of dosage prescription of topical medications. Most physiotherapists opined that Pharmacology is relevant, useful and have has positive impact on clinical physiotherapy practice; and that it increases quality of practice. The clinical implication of this study is that most patients been attended to by respondents might not be getting effective dosages of topical medications for significant therapeutic effects. It may also imply inadequate knowledge among those who had formal pharmacology education during undergraduate training. Although, the small sample size in this study might be a limitation for the interpretation of the findings. This study recommends larger sample size in the future.

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## Appendix

### Questionnaire

This questionnaire is designed to know the opinion of physiotherapists on pharmacology education obtained while undergoing physiotherapy training and its subsequent effect on clinical practice. You are assured of utmost confidentiality regarding the information you give in answering this questionnaire, therefore you are enjoined to answer the proceeding questions truthfully and honestly. Thank you very much.

#### **SECTION A: Demographics and academic related data.**

(Please tick the appropriate response)

1. Gender: male(  ) female(  )
2. Age:
3. Physiotherapy program undergone:
  - a. 4yr program (  ) b. 5yr program (  )
4. Years of experience in clinical practice in physiotherapy:
  - a. <5yrs (  ) b. 6-10yrs (  ) c. 11-15yrs (  ) d.15-20yrs (  ) e. >20yrs (  )
5. Highest qualification attained:
  - a. Bachelor degree in physiotherapy (  )
  - b. Masters in physiotherapy (  )
  - c. Doctorate degree in physiotherapy (  )
  - d. Professor of physiotherapy (  )

#### **SECTION B1 (for physiotherapists who had undergraduate pharmacology training)**

1. Did you do pharmacology as an undergraduate course?  
 Yes (  ) b. No (  )
2. Did you study pharmacotherapy, or any related course as an undergraduate?  
 a. Yes (  ) b. No (  )
3. What was the duration of your training? Tick as appropriate.
  - a. 1semester b. 1 session
4. Were you taught in (Tick as appropriate)
- a. Basic medical sciences (Pre-clinical) b. Clinical sciences

#### **Section B2 (For all P.Ts)**

5. Where do you presently practice?  
 A. Teaching/General hospital (  ) b. State hospital (  ) c. Private practice (  ) d. Academics (  )
6. When did you last update your knowledge of topical drugs?  
 a. >10yrs ago (  ) b.5-10yrs ago (  ) c.1-4yrs ago (  ) d. <1yr ago (  ) e. never (  )
7. Have you ever attend seminars related to topical drugs and its uses (pharmacotherapy)? a. Yes (  ) b. No (  ),  
 How many times? a. 1-5 (  ) b. 6-10 (  ) c.>10 (  ) d. never (  )
8. Is your present knowledge of pharmacotherapy based on
  - a. Seminars attended. (  ) b. private reading (  ) c. years of practice (  ) d. journals (  ) e. interaction with other physiotherapists and general medical practitioners (  ) f. school training (  )

#### **CURRENT KNOWLEDGE OF PHARMACOTHERAPY:**

#### **SECTION C1: (for PTs who had undergraduate pharmacology training)**

1. During undergraduate pharmacology training which of these drugs were you taught. (i.e. actions, interactions, side effects, indications, contraindications, and dosage.) (tick as appropriate)
  - a. Piroxicam (  )

- b. Diclofenac ( )
  - c. Methyl salicylate ( )
  - d. Menthol ( )
  - e. Ketoprofen ( )
  - f. Glucosamine ( )
  - g. Gentamicine ( )
  - h. Histamine ( )
  - i. Diethylamine ( )
2. Which of the under listed drugs were you taught the clinical applications of the topical forms?
- a. Piroxicam ( )
  - b. Diclofenac ( )
  - c. Methyl salicylate ( )
  - d. Menthol ( )
  - e. Ketoprofen ( )
  - f. Glucosamine ( )
  - g. Gentamicine ( )
  - h. Histamine ( )
  - i. Diethylamine ( )
3. Were you taught more of the oral than the topical form of the above drugs?  
Yes ( ) No ( )
4. Were you taught pharmacology along with other medical students? Yes ( ) No ( ).
5. Do you think that the teaching should be separated to be specific, for physiotherapy application? Yes ( ) No ( ).

**Section C2(This Section is For All PTs)**

6. In what condition would you prefer the usage of Voltaren gel (diclofenac diethyl ammonium) to Neurogesic cream (Methylsalicylate gel)?
- a. Acute inflammatory conditions .....Yes ( ) No ( )
  - b. Chronic conditions ..... Yes ( ) No ( )
7. Equivalence of 1 FTU is 0.5 gram?  
Yes ( ) No ( )
8. The dosage of a typical topical drug is a. 1FTU b.2FTU c.3FTU d. 4FTU.
9. The dosage of Voltaren is a. 1FTU b. 2FTU c. use of dosage card.
10. Iontophoresis is the migration of drug molecules through the skin under the influence of an Electrical Muscle Stimulator. Yes ( ) No ( ) I Don't Know ( )
11. Phonophoresis is the migration of drug molecules through the skin under the influence of ultrasound. Yes ( ) No ( ) I Don't Know ( )
12. Will you support a legislation that will officially permit physiotherapists to prescribe topical drugs?  
Yes ( ) No ( ) I Don't Know ( )
13. Will you support a legislation that will officially permit physiotherapists to prescribe OTC (Over-The-Counter) drugs?  
Yes ( ) No ( ) I Don't Know ( )
14. Are you aware that there is a specialty known as physical pharmacotherapy/pharmacophysical therapy?  
Yes ( ) No ( ) I Don't Know ( )
15. Will you be willing to study physical pharmacotherapy/pharmacophysical therapy in a postgraduate training?  
Yes ( ) No ( ) I Don't Know ( )

**SECTION D:** This section is designed to evaluate the quality of physiotherapist's opinion on the relevance/usefulness of undergraduate pharmacological/pharmacotherapy study. With reference to the keys, please circle the response nearest to your view.

**KEY:** 5 – Very Strongly Agree

4– Strongly Agree

3. – Agree

2– Disagree

1 – Strongly Disagree

	1	2	3	4	5
1. My practice, (skill, knowledge of topical drugs and advice/prescription to patients) would have been better if I had a better and more extensive knowledge of pharmacology					
2. I am aware of up-to-date research information (such as systematic reviews) that provided best practice information. I have good knowledge of topical NSAIDs (i.e. their efficacy as an adjunct to physiotherapy management, the systemic effect on the patient, and any potentially adverse effects for me as the therapist administering it).					
3. I would be able to interact better with and feel less inferior to my medical colleagues if my knowledge of pharmacology and other medical procedures like laboratory tests were more sound e.g. while on holistic ward rounds with other medical colleagues.					
4. I would view the practice of physiotherapy in a more positive light if most of my colleagues had a better and more extensive knowledge of pharmacotherapy.					
5. If I had the opportunity to gain more knowledge about pharmacotherapy, drug interactions, and attend other drug related seminars, I would .					
6. There should also be a forum for physiotherapists to learn practical pharmacology from pharmacists.					
7. There is adequate undergraduate and post-graduate training in the field of pharmacology.					
8. There is adequate undergraduate and post-graduate training in the quality use of medicine					
9. There is adequate undergraduate and post-graduate training in ethics and prescriptions of NSAIDs					
10. There is adequate undergraduate and post-graduate training in the key legislative aspects of usage of topical drugs relevant to physiotherapy.					
11. My knowledge of pharmacology is enough to prescribe Over-The –Counter drugs.					
12. I think that pharmacology is relevant to my clinical practice.					
13. I like the fact that pharmacology has been included in undergraduate physiotherapy training					
14. I think that an extensive knowledge of pharmacotherapy is useful to my practice and increases the quality of my practice.					
15. Pharmacology knowledge acquired has had a positive impact on my clinical practice.					

Thank you very much for your cooperation. G